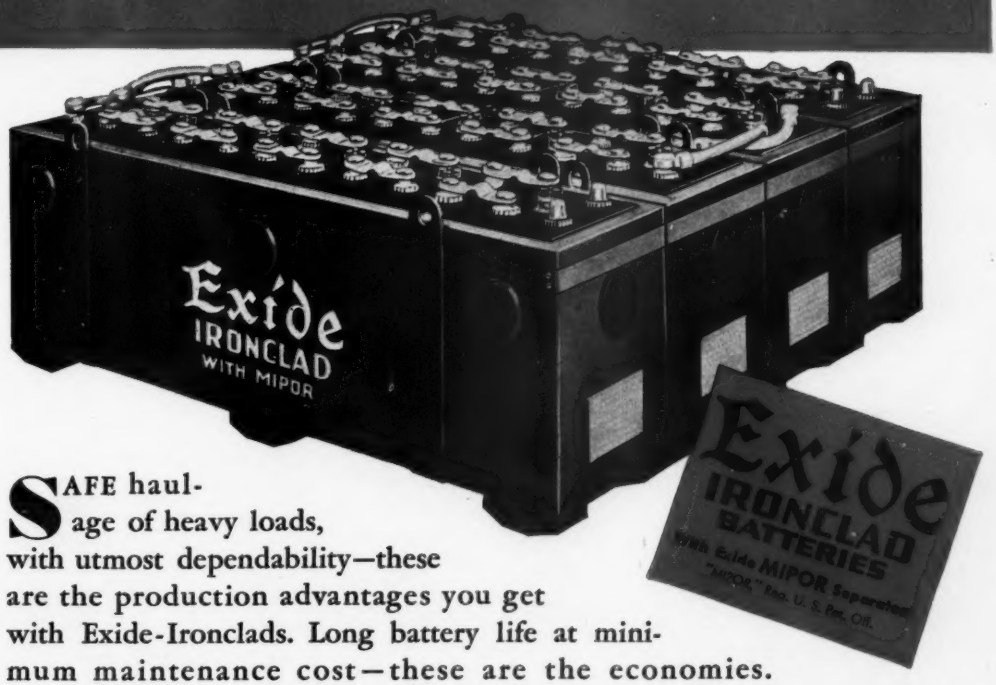
MINING CONGRESS JOURNAL

TEMBER, 1940

SAFE . . . DEPENDABLE HAULAGE
WITH EXIDE-IRONCLADS



SAFE haulage of heavy loads, with utmost dependability—these are the production advantages you get with Exide-Ironclads. Long battery life at minimum maintenance cost—these are the economies.

Together, they show why more Exide-Ironclads are used underground than all other batteries combined. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

OFFICIAL

Now FORMEX Rep. U. S. Pat. Off. MAGNET WIRE HERE

IN G-E DIRECT-CURRENT MINE MOTORS FOR LONG INSULATION LIFE UNDER SEVERE OPERATING CONDITIONS

Stator assembly of typical G-E direct-current mine motor

IT'S not just the moist, corrosive atmospheres of many coal mines that's so tough on the motor insulation in direct-current mine motors. It's also the voltage surges on the underground circuits, the frequent overloads, the across-the-line starting of larger motors, and low voltage at the mine face. All of these cause either mechanical shock or injurious overheating, and that makes it hard for the insulation, particularly of the field coils, to stand up for even a normal period of service.

That's why General Electric is now using Formex magnet wire for the main field coils of its direct-current mine motors.

"Formex" identifies a new G-E magnet wire insulated with a synthetic resin of the vinyl acetal type. It is a product of many years' research and experimentation by G-E engineers and scientists.

Physically, Formex has outstanding qualities. It retains the high dielectric strength of conventional enamel. It is at least three times tougher and more flexible and much more resistant to abrasion. It shows no tendency to become brittle, crack, and lose its toughness on long exposure to heat.

Another advantage of Formex is that it is resistant to the solvents used in the treating varnishes that are applied to winding assemblies.

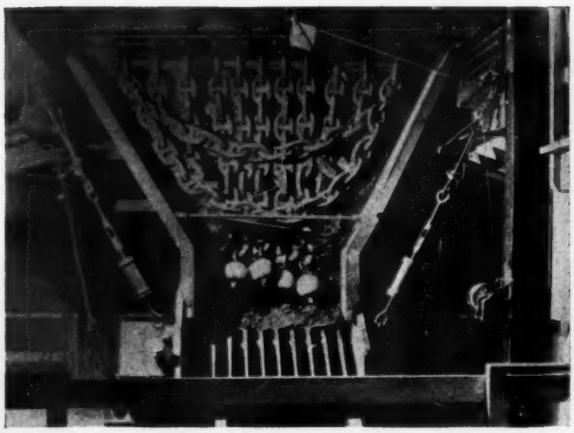
Think what just this one feature of G-E direct-current mine motors means! Fewer repairs and replacements, greater assurance of continuous operation, lower costs per ton of coal mined! Why not plan now to get these advantages? You need only specify "General Electric motors" in your equipment order. Or, if you prefer, talk over your requirements with our nearest representative. General Electric, Schenectady, N. Y.

GENERAL ELECTRIC

687-3

J-T VIBRATORS SERVE THE METAL INDUSTRIES

JEFFREY-TRAYLOR CONVEYORS - FEEDERS - SCREENS - WAYTROLS



No. 5 vibrating grizzly feeder discharging run-of-mine ore at the rate of 350 T.P.H. to primary jaw crusher.

Battery of 42 No. 3 feeders discharging to gathering belt conveyor. Arrangement provides accurate control of feed rate as well as complete drainage of bin.

Battery of FB type screens handling damp, difficult materials. Piano wire cloth used.

Totally enclosed 4′ x 7′ electric vibrating conveyanscreen equipped with 60 mesh stainless cloth.

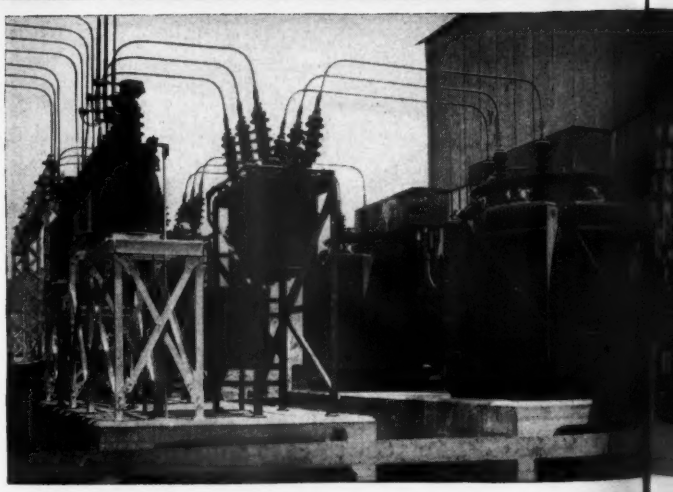
VISIT OUR DISPLAY AT COLORADO SPRINGS

THE JEFFREY MANUFACTURING COMPANY

COLUMBUS, OHIO

THE

Ignitron Rectifier



This latest model of Ignitron Rectifier, for a large copper mine, is the first to be installed in the metal mining industry. It can take a 300% overload for 5 minutes. Illustrated also are power transformers, circuit breakers and switching equipment serving this installation.

WESTINGHOUSE ELECTRIC

Westinghouse

for modern POWER CONVERSION

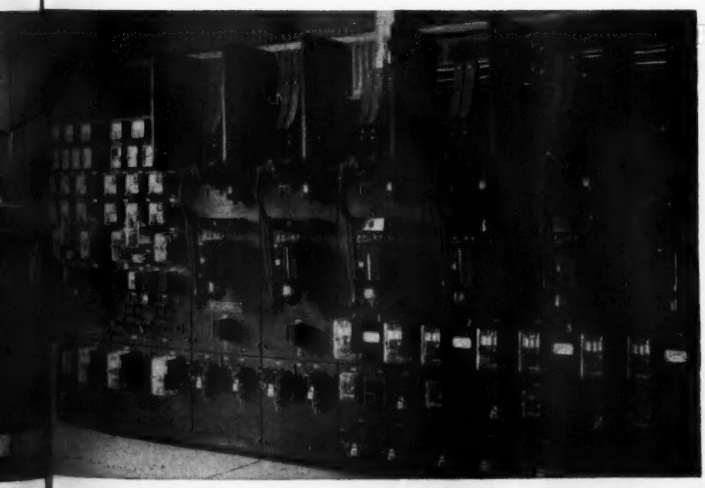
The Westinghouse Ignitron Rectifier has proved to be an outstanding performer in mining power conversion service. It maintains high efficiency from light loads to overloads, and can supply overloads up to 300% for 5 minutes. It occupies little space, requires no special foundations and can readily be moved as conditions require. Dependable, easy to make fully automatic, it needs little attention or maintenance. In short, the Westinghouse Ignitron Rectifier is the most modern method of power conversion for mining operations.

Developments such as this typify Westinghouse service to the mining industry. Because of our years of close association with mining problems, we offer you exceptional service on any electrical requirement, whether it be for a standard motor—or recommendations for complete electrical modernization.

Our local offices are prepared to give you fast, capable action.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
EAST PITTSBURGH, PA.

Tune in "Musical Americana," N. B. C. Network, Coast-to-Coast, every Tuesday evening. J-94365



Mining Equipment

MEETING A SERVICE CHALLENGE

Coal mine shaker conveyors work in cramped quarters. If a conveyor fails, everything stops until repairs or replacements are made. So conveyors must be capable of continuous operation.

One manufacturer now meets the challenge by using Chromium-Molybdenum (SAE 4140) Steel for the all-important crank shafts of his shaker conveyors.

When properly heat treated, the steel develops good tensile and fatigue strength in the 5¾" section used, together with adequate hardness. Conveyor crank shafts made of this steel are achieving remarkable service records.

If anywhere in your product there is a part which presents special difficulties it may likewise pay you to investigate the possibilities of Molybdenum steels. Complete data will be found in our technical book, "Molybdenum in Steel," which is sent free to interested production executives and engineers on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

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MINING CONGRESS JOURNAL

Vol. 26 SEPTEMBER, 1940 No. 9

The October Issue

will bring you a complete report of the 7th Annual Metal Mining Convention and Exposition, as well as a splendid group of operating articles featuring various phases of coal and metal mining.

Of special interest to coal mining men will be the article by Thomas A. Stroup, Assistant to the Vice President of the West Virginia Coal & Coke Company, entitled "Mechanization Trends in the Logan County Field." This will stress the modernization progress of one of the Nation's leading coal fields.

Watch for it!

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

Published monthly. Yearly subscription, United States, $2.00. Foreign (including Canada), $4.00. Single copies, $0.20.
Entered as Second-Class Mail Matter, January 30, 1915, at the Post Office at Washington, D. C.
Member, Audit Bureau of Circulations.

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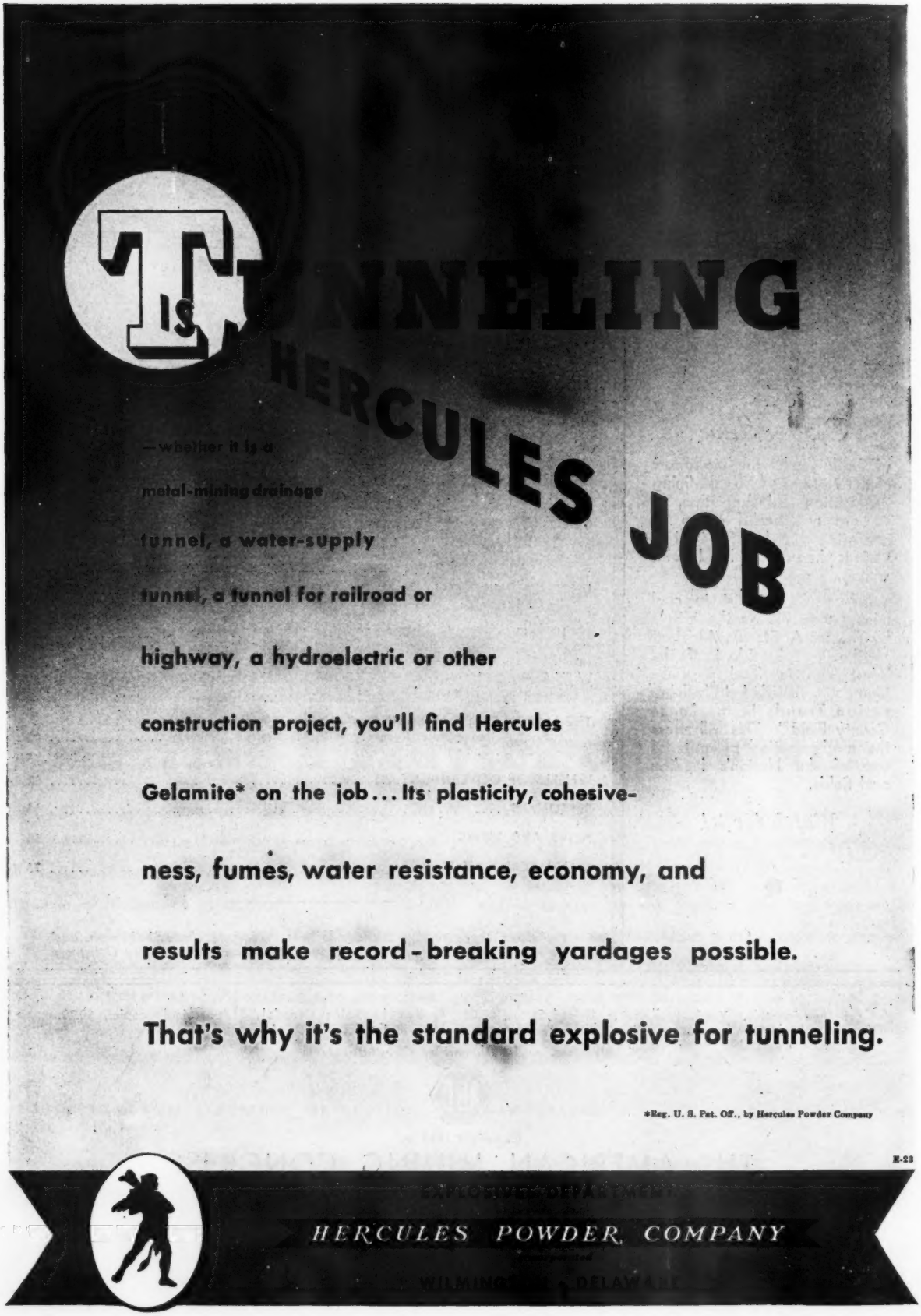
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That's why it's the standard explosive for tunneling.
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E-23
HERCULES POWDER COMPANY

MINE TIMBERS

By REAMY JOYCE
District Sales Manager
The Wood Preserving Corporation

IN 1928, a bituminous coal company completed an 8500-foot drainageway for the water from four large coal mines. It was timbered with 1400 three-piece timber sets. The timber was expected to last 10 years, but in the third year many failures from decay occurred. The use of timber sets pressure-treated with salts and with creosote was begun. Careful cost and service life records were kept. By using the capitalized cost method, these records showed this result:

	Untreated Timber	*Treated Timber*
Initial cost per set in place.....	$7.48	$8.73
Present worth of renewal 3 years hence at 4% ...	6.65	
Present worth of cost to assure 6 year protection..	14.13	8.73

The company figured originally that six years of service could reasonably be expected from the pressure-treated timber, and on that basis, it estimated that $5.40 per set was the present worth of the saving effected by using treated timber if it had an average life of six years.

More than six years have now passed and the pressure-treated timber is still free from decay. From what is known of the service records of creosoted material in surface use, it may be assumed that the timbers treated with creosote should be good for the life of the heading, which is estimated at 20 years. In this event, using the annual charge formula, we arrive at the following projected savings:

	Cost in Place	*Life Years*	*Annual Charge*
Untreated	$7.48	3	$2.695
Creosoted	8.73	20	0.642
Annual saving per set			$2.053
20-year saving per set			41.06
20-year saving 1400 sets			$57,484.00

The life of the salts-treated sets is difficult to project because one leg of the timber sets is in the water ditch and for this reason a failure is anticipated in this leg earlier than would ordinarily occur.

When these treated timber sets were first installed, no provisions were made for treated cribbing, lagging or wedges to support the roof above the cross bars. Three years later, untreated cribbing began to fail from decay and there were falls, some of which knocked down the treated sets. All the cribbing, blocking and wedging was replaced with treated material and since that time there has been no trouble from this cause.

MAIL THIS CARD FOR YOUR COPY

THE WOOD PRESERVING CORPORATION, 731 KOPPERS BLDG., PITTSBURGH, PA.

SEND ME THE BOOKLET:

"ECONOMICS OF WOOD PRESERVATION IN UNDERGROUND COAL MINES"

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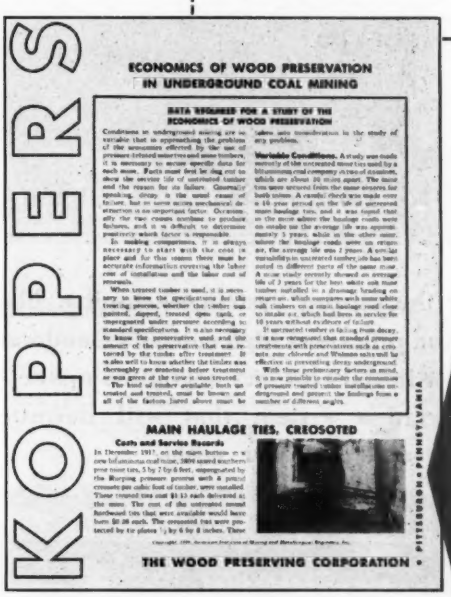
CITY AND STATE _____


KOPPERS
ECONOMICS OF WOOD PRESERVATION IN UNDERGROUND COAL MINING
DATA REQUIRED FOR A STUDY OF THE ECONOMICS OF WOOD PRESERVATION
MAIN HAULAGE TIES, CREOSOTED
Costs and Service Records
THE WOOD PRESERVING CORPORATION
PITTSBURGH • PENNSYLVANIA

DO YOU KNOW

HOW ONE MINE SAVED $11,779.71 IN TIE COSTS

HOW AN INVESTMENT IN PROTECTION PAID 527% PROFIT

HOW AN OPERATOR CUT TIMBER COSTS OVER 75%

HOW A LARGE COMPANY SAVED $41,760 IN CAR COSTS IN 12 YEARS

If you're interested in Bigger Profits, read this book. It gives facts and figures on how other operators are boosting earnings by cutting costs.

OTHER USES FOR PRESSURE-TREATED TIMBER: Tipples • Pilings • Guard Rails • Fences • Poles • Buildings, Bins, Sheds • Piers, Docks, Wharves • Platforms • Flooring • Tanks, Sumps, Vats • Crossing Planks • Barge Sides and Bottoms • Cable Ways • Conduit • Culverts • Flumes • Trench Lining and Covers • Conveyor Decking and Supports.

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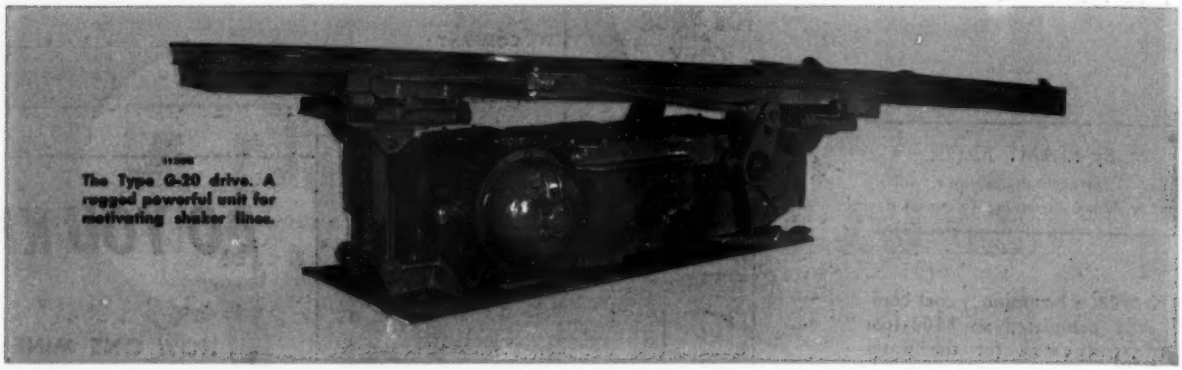
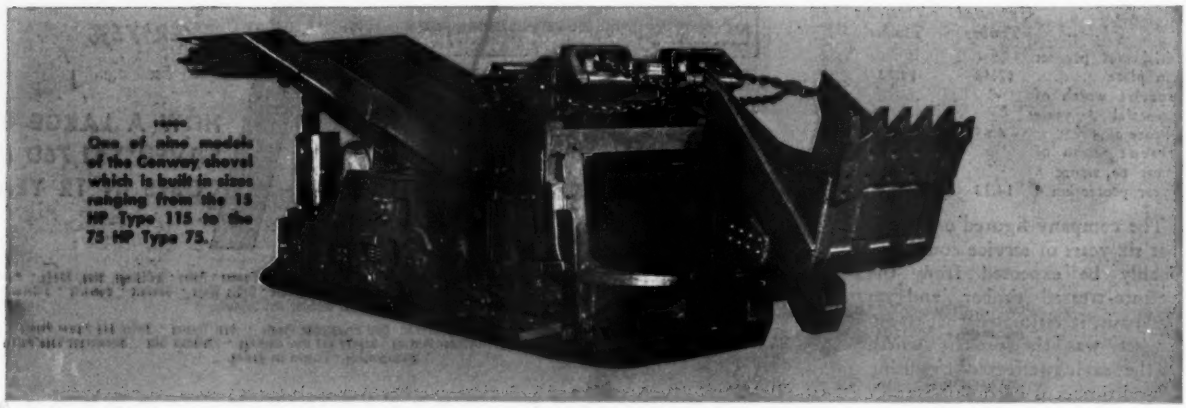
Move your ore the MODERN WAY



The Type G-20 drive. A rugged powerful unit for motivating shaker lines.

Whatever the mining system — stoping, block caving, slicing, or room and pillar—a high capacity Goodman shaker conveyor, with its low initial cost and negligible upkeep expense, provides a transportation system that will definitely increase your production and cut your costs.



One of nine models of the Conway shovel which is built in sizes ranging from the 15 HP Type 115 to the 75 HP Type 75.

The Type 115 Conway is particularly adapted to metal mine service. With it, all types of material from fine sand to blocky granite is easily handled, drifts are driven more rapidly, and loading time is reduced with a consequent increase in time for drilling and timbering.

For complete details of this modern method of mining ore visit the Goodman operating exhibit at the Metal Show

Booth 407 - 409 - 411

Goodman

MANUFACTURING COMPANY

HALSTED ST. AT 48TH — CHICAGO, ILLINOIS

Sturdier track installed as easy as

WITH BETHLEHEM HEAVY DUTY STEEL MINE TIES

With mechanization making ever-increasing demands upon the entire mine haulage system, the need for really sturdy mine track has greatly increased.

Many operators have found in Bethlehem Heavy-Duty Steel Mine Ties a product which not only makes for more rugged installations, but for faster installations as well, making it possible to keep the haulage system right up with the cutters and loaders.

LAY TIES—Note how these Bethlehem Heavy-Duty Ties, less than an inch in height, hug the floor, saving valuable head room, and how the flanges and the bearing surface grip the ballast.

LAY RAILS—Note how the outer, stationary clips on these No. 4 Bethlehem Steel Ties automatically gage rails, saving time and eliminating the necessity for gage rods.

LOCK CLIPS—Note how the patented clips on these No. 4 ties grab the flange of the rail, locking ties and rails into a single sturdy unit. Clips unlock just as easily, too, when taking up rails for relaying.

Bethlehem Steel Mine Ties are made in five standard sizes, as well as in special designs for rail extension and for use in rooms where weights of rail sections vary. The weight of the tie can thus be suited to the weight of the rail used on a particular line.

Used with other units in Bethlehem's complete line of steel mine-track equipment, Bethlehem Steel Mine Ties insure maximum tonnage hauled with minimum time lost for repairs and replacements. Write to Bethlehem Steel Company, Bethlehem, Pa., for Booklets 71 and 72-A, describing complete Bethlehem line of mine track equipment.

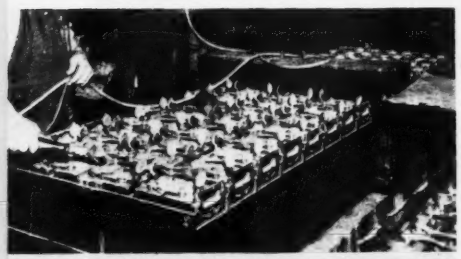
BETHLEHEM STEEL COMPANY

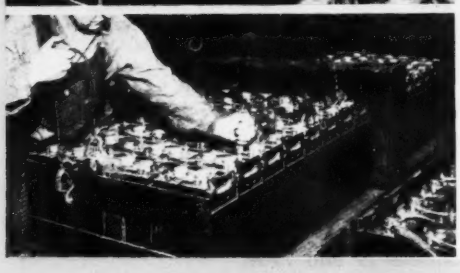
BETHLEHEM STEEL

STORAGE BATTERY POWER

CHARGING of alkaline batteries can be completed in less time than is required by other types of batteries.

LAYING UP alkaline batteries is simple. Merely test solution level for correct height, discharge, shunt circuit and store in a clean, dry place. Then there will be no deterioration and no need of attention whether the lay up is three months or three years. (BELOW)



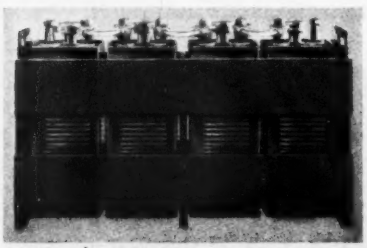


(Continued from Page 11)

Rapid charging without finish-rate limitations permits charging equipment to operate more nearly at capacity (and therefore at higher efficiency) and sometimes permits use of smaller charging equipment than might otherwise be necessary. A mine operating fifty batteries, for example, may be able to charge them in two successive groups of twenty-five whereas slower charging might necessitate equipment large enough to charge all fifty at one time.

Can Work Hard at High Temperatures

THE STEEL CELLS of the alkaline battery are good heat conductors and are always assembled



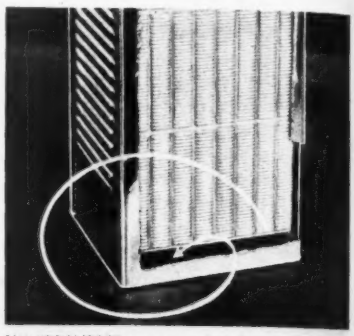
AIR CIRCULATION on all sides of every cell enables the alkaline battery to dissipate heat rapidly.

so as to allow free air circulation on all sides of each cell. With adequate ventilation surplus heat is removed rapidly. This helps explain the alkaline battery's superior ability to work hard in the elevated temperatures common underground.

Stands Idle Indefinitely Without Attention, Injury or Expense

DISCHARGED, CLEAN, DRY and properly flushed, alkaline batteries may be withdrawn from service for indefinite periods without risk of injury. Recharging is all that is necessary to return them to active service.

Meantime they require no attention whatever and therefore no expense.



NO SEDIMENT space is required in alkaline cells because all active materials are retained in tubes and pockets of perforated steel.

Delivers Extra Power for Acceleration Yet Protects Against Overloads

THE ALKALINE BATTERY, in the A and C types recommended for tramming service, delivers extra power for grades or acceleration up to the limit which wiring, motors, controllers and other parts of the circuit can normally withstand. But it possesses a higher internal resistance than equivalent acid batteries which serves to protect both itself and other equipment in circuit against overload or burnout.

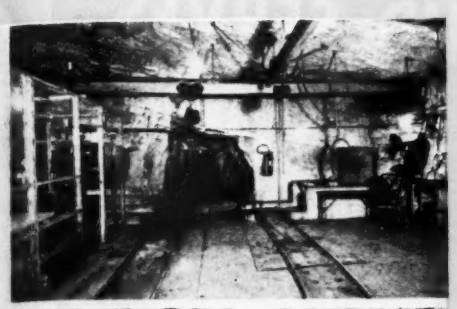
This feature is of great value not only in acceleration or on grades, but also in case of grounds in the wiring or a stalling of the motor against an obstruction.

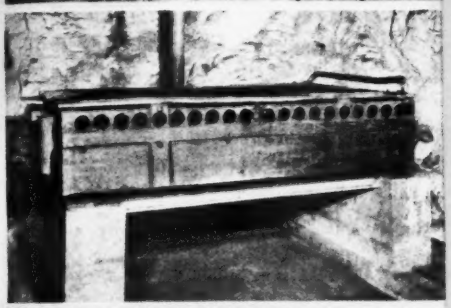
From this it might appear that more power is required for charging than with other batteries

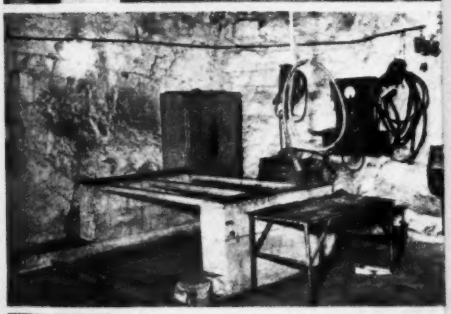
BATTERY EXCHANGE for continuous tramming is a quick operation in a station like the one shown in the four views to the right. Tramrail with hoist extends over track to charging benches on both sides (TOP). At the time these pictures were taken one bench contained a charged battery (SECOND FROM TOP) while the other was empty revealing in detail the ventilating feature of the benches (THIRD FROM TOP). Procedure is to spot locomotive between the two benches (BOTTOM) hoist off battery to empty bench, then hoist on the charged one.

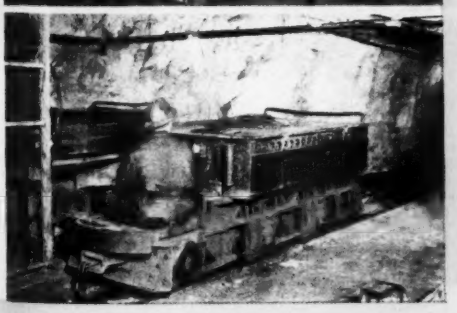
EDISON STORAGE BATTERY

for the TRAMMING OF ORE









THESE TWO PAGES

are reproduced from MODERN ORE TRANSPORTATION UNDERGROUND, a bulletin which presents the advantages of storage battery power for the tramming of ore; also explains what the Edison Steel-alkaline Storage Battery has done to bring these advantages within the reach of virtually any metal mine, even though operating conditions are severe. Copies may be obtained at our exhibit or from any of our district offices.

*[*We favor adequate preparedness for national defense and recommend enlistment in the U. S. Army to eligible young men.*]*

Division of* THOMAS A. EDISON, *Incorporated

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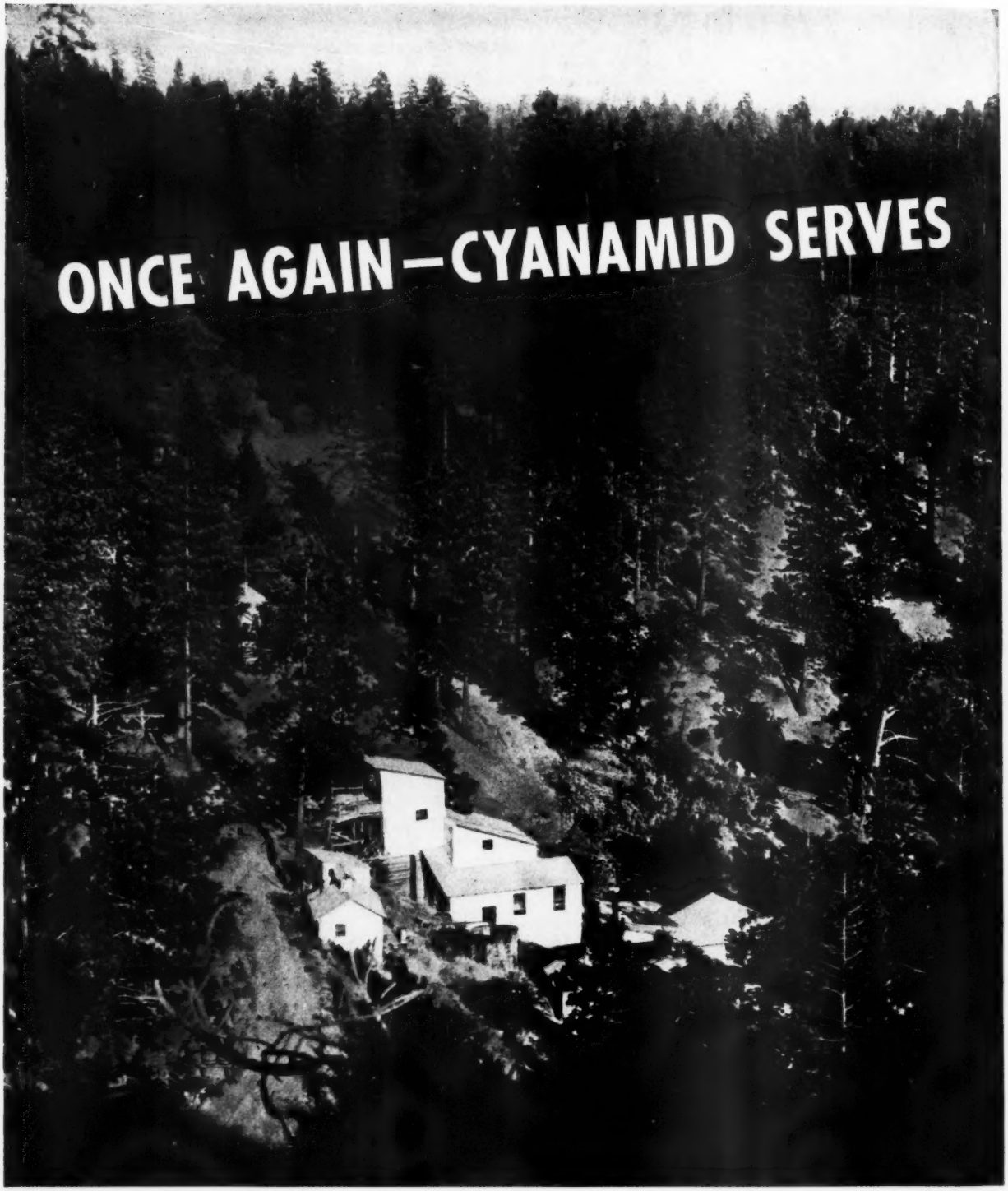

AMERICAN CYANAMID

A Complete Metallurgical-

30 ROCKEFELLER PLAZA,

ALL FOUR "FEATURED MILLS"

Surcease, Gold Acres, Guysborough and Summit King

No exceptions are the mills "featured" in the 1940 Feature Enterprise Issue of ENGINEERING and MINING JOURNAL. In fact, any representative group of small or large mills with surprisingly few exceptions will be users of Cyanamid Reagents, Fagergren Flotation Machines or Cyanamid Technical Service.

Although Cyanamid numbers among its customers almost every large mill in the world, Cyanamid Field Engineers have for many years devoted a preponderant part of their time to assisting small mills to achieve higher recovery at lower cost. Mostly, this has been shirt-sleeve work in the mill itself trying reagent combinations under actual operating conditions. But, where necessary, the services of the Chemical, Physical and Microscopical Departments of the Cyanamid Ore Dressing Laboratory are drafted to assist in the test work or even to develop a new reagent to solve a peculiar problem.

Cyanamid Service to Metallurgy has always looked beyond the commercial considerations of the present to make available to large and small mines alike a convenient source of reagent supply *plus* a technical service in their application that helps these mills to achieve higher recovery at lower cost.

Whether your mill is nearby or remote, whether you can best use flotation or cyanidation, or a combination of these with older recovery processes, we invite you to make full use of Cyanamid Service to Metallurgy.

From time to time Cyanamid publishes in ORE DRESSING NOTES technical papers covering noteworthy advances in beneficiation methods. If you are not receiving ORE DRESSING NOTES, or if you have changed your address within the past year, please use the coupon below.

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NEW YORK

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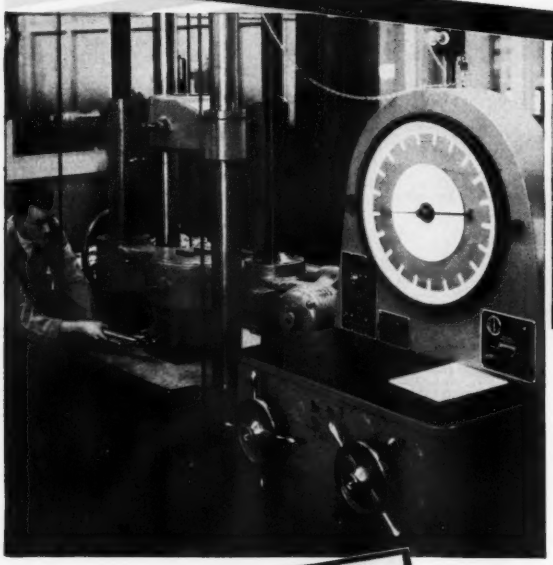
LET THE *Miracle of Wedge Action* DO YOUR BONDING!

20,000 Lbs. of Expansion Pressure "Cold-Welds" O-B Wedge Bond Terminal to Rail!



Here's how it's done. Insert the terminals and hardened steel wedges in the drill holes - - drive the wedges in with a few hammer blows - - and "on to the next joint"!

★

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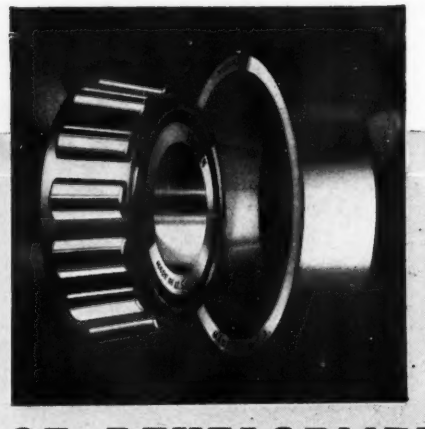

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THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

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A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 26 SEPTEMBER, 1940 No. 9

A CAUTION ON COAL

AS the industrial tempo quickens in the present emergency, it is important to bear in mind the natural resource products which proved to be so vital in the days of 1917-1918. What then of coal? Coal producers are prepared to do their full share toward the national defense, as are all other branches of mining, but there are certain questions which must be born in mind and the public must not be led to expect the impossible. There is a practical side to the conduct of coal mining under national emergency conditions and those who experienced the days of 1917 to 1921 know how quickly demand can mount and transportation falter. Before assuming that the coal industry is ready for any emergency it is suggested that serious thought be given to the following questions:

How will conscription affect our employes?

What inroads will be made on our skilled employes by other industries?

What priorities can we expect in the matter of securing new equipment and maintenance of present equipment?

Will necessary supplies and material be readily available?

How will the forthcoming wage negotiations (present contract expires March 31, 1941) affect our ability to meet demands?

Will transportation facilities be available for both rail and water deliveries?

Will all producing fields receive equal demands or will demands fall upon special types of coals?

Will the operation of any of these provisos affect all mines alike or would they affect the mechanized mines producing 10 to 15 tons per man per day to a greater extent than the mines producing 4 to 6 tons per man per day?

Only recently a careless public statement was made to the effect that the railroads of the country are ready to handle 40 percent more freight than is now being hauled. An official of one of the best railroads caused a check-up to be made by applying a theoretical 40 percent increase to the road's present business, with the startling discovery that existing facilities permitted an increase in loading of but little more than 15 percent.

Over 20 years have passed since the strenuous World War days and a new generation is operating the mines, the railroads and the National Defense Commission. No one doubts the serious and patriotic desire of everyone to do his uttermost for the national good but to acknowledge the bearing of the above questions on the emergency is in our opinion only good logic.

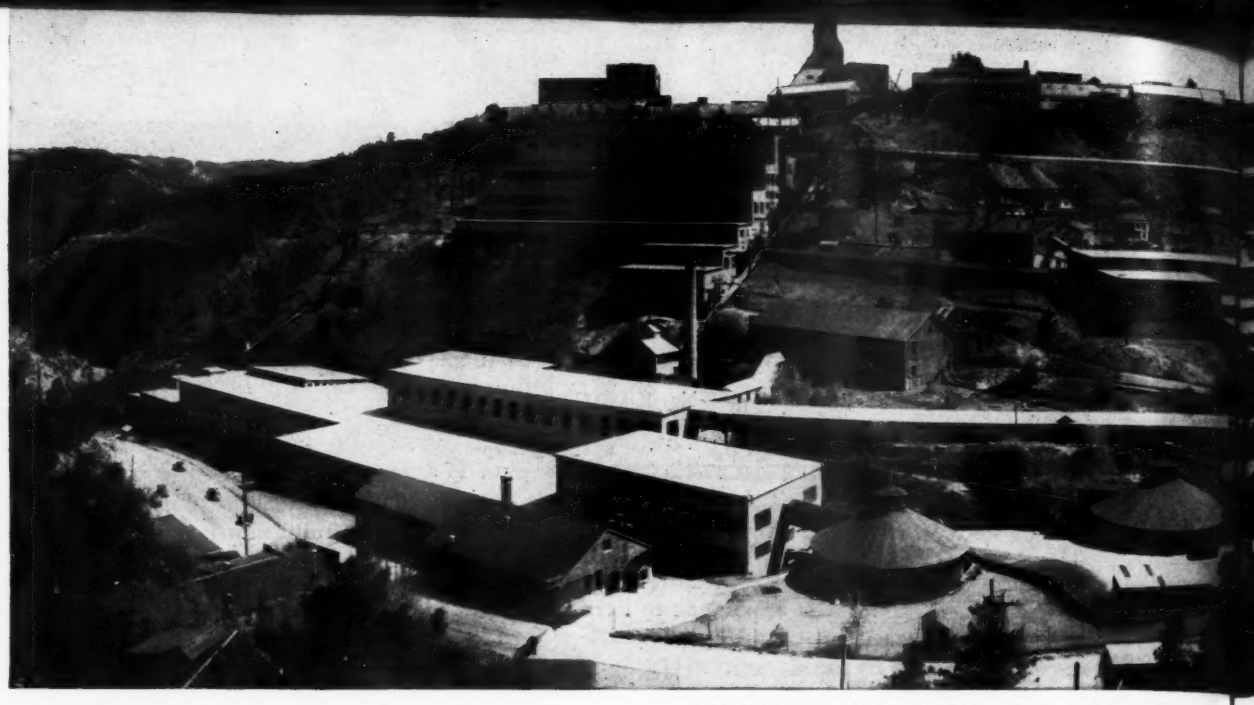
WHAT OF THE SMALL MINE

THE Excess Profits Tax Bill was rushed through the House of Representatives with few, if any, members having opportunity even to read it, much less to understand its complicated, intricate and novel provisions. Whatever its effect on corporations with large invested capital and a fairly uniform income each year, it seems to be very unfair to the small mines, with little invested capital and irregular incomes, fluctuating widely from year to year.

The mine which has been under development for several years, and is just coming into production, may have most of what is really only its normal income treated as "excess profits" and very heavily taxed. Even the mine which had reasonably satisfactory average earnings for the 1936 to 1939 base period and wished to use the base period earnings method is penalized by a 4.1 percent additional tax on its entire net income, heaped upon its 20.9 percent normal income tax, and in addition to a heavy tax, ranging as high as 50 percent, upon any so-called "excess profits."

The provisions of the bill are so involved and uncertain that it will be years before anyone can know with any certainty what his tax liabilities may be.

The bill is now before the Senate and it is to be hoped that there, at least, some better consideration may be given to the situation in which the small mines find themselves. Something should be done to relieve these mines of the devastating vagaries of the "excess profits" tax in the now pending bill.



BIRD'S-EYE VIEW OF MAIN HOMESTAKE OPERATIONS

Top, left to right: Yates Shaft Group; Foundry and Shops—Warehouse
Upper center: South Mill; Refinery; Cyanide Plant
Lower center: Cyanide Plant; Cyanide Plant
Bottom: Mill Office and Assay Office

HOMESTAKE'S NEW YATES SHAFT

● ***Ultra-Modern Equipment Designed For Safety and Efficiency Included in This, One of Metal Mining's Major Recent Developments. Carrier-Current Signal System Important Feature***

By HARLAN A. WALKER
Homestake Mining Company
Assistant General Manager

ABOUT 4,000 tons of ore are milled daily at Homestake and this tonnage is produced by the mine in a 6-day week. In addition, about 600 tons of waste are broken in development work. All hoisting, including the handling of men and supplies, is normally done through two shafts, of which the Ellison is 3,200 ft. deep and the Ross 4,100 ft. in depth. Deep development has now reached 4,600 ft.

Several years ago increasing ground subsidence in the Ellison shaft area and other factors pointed to the necessity of a new shaft to replace the Ellison, and, following considerable detailed study, a location was chosen 2,077 ft. east of it. Work was started the fore part of May, 1938, both underground and on surface. In all, a hundred thousand cubic yards of rock were moved by Diesel shovel and bulldozers in preparing the site for the shaft and surface plant. The collar elevation is 5,310 ft. Present plans call for a depth of 5,000 ft.

Size of Shaft

In size, the Yates shaft compares with the Ross and Ellison as follows:

Shaft	*Outside Dimensions*	*Timber*
Yates	15′ 0″ x 27′ 8″	10″ fir sets
Ross	14′ 0″ x 19′ 3″	6″ special steel sets
Ellison	12′ 0″ x 20′ 0″	12″ fir sets

The Yates cage compartments, of which there are two, are 6 ft. 1 in. by 13 ft. 4 in., as compared with but one cage compartment in the Ross of 6 ft. 1 in. by 13 ft. 0 in. (Fig. 1). The latter shaft has a counter weight compartment, so that the cage may be moved in balance. The two skip compartments are 5 ft. 9 in. by 6 ft. 2 in., and in the Ross they are 5 ft. 7 in. by 5 ft. 8 in. A third cage compartment for runabout work is 5 ft. 9 in. by 6 ft. 8 in.; there is no runabout cage in the Ross. Both shafts have pipe, power cable and manway space. The

Ellison Shaft Group

Overpass for School Children

Ellison shaft has two skips, one cage, one counter weight and one pipe compartment. The use of steel sets in the Ross shaft has not proven as satisfactory as timber, and the Yates is therefore being timbered with Oregon fir, except for the first 300 ft. below the collar, which are concreted to insure added protection against fire.

Highly accurate engineering work was necessary to establish adequate control points both on surface and underground, in order to make possible the simultaneous driving of the shaft from several points in existent workings. Figure 2 indicates the headings driven from the mine workings to the point where pilot raises were advanced in the shaft prior to cutting or widening it out to full size. To simplify the diagram, all headings are shown as having been advanced from the left, with tail drifts to the right of the shaft, although in reality the work was most proximate to the new shaft location.

Pilot Raises

Usually the pilot raises, which were 6 x 8 ft. in cross section, were only driven 100 to 150 ft. between levels, but in one case (from the 800-ft. level) the raise was driven 866 ft. for connection, necessitating special ventilation, a small cage and a well-timbered raise. Normally the work was done with timbered raise, manway and chute.

Stripping

Following connection of a pilot raise, stripping to full size was undertaken, two crews operating in different sections of the shaft when it was possible to handle the waste. Timbering followed closely behind stripping operations. The waste produced was drawn off from the next lower connecting level for backfilling or transfer to another level. Meanwhile drilling crews began driving ore pass raises and ore pockets, and as it was possible to work from several points at the same time, the shaft advance was materially expedited. There have been as many as 125 men working on the project at one time—raising, drifting, stripping, timbering or cutting stations.

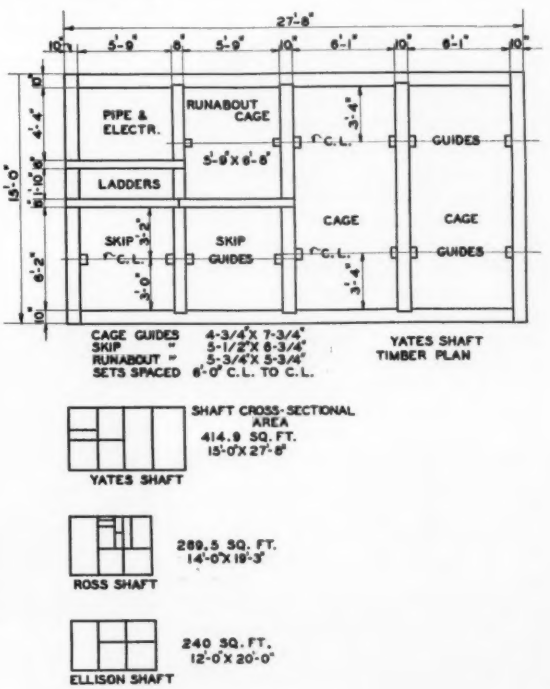


Figure 1

Timber plan of Yates Shaft, showing comparative size of shaft's cross sectional area with that of the Ross and Ellison shafts.

SURFACE PLANT

The surface plant includes the main hoist building and motor generator room, the headframe and crusher structures, storerooms at the shaft below the collar, the change house and lamproom and three tunnels radiating out from the shaft. Nearby there will be a new reinforced concrete compressor building, mine carpenter shop and a mine office building.

The Headframe and Crusher Building

The headframe, which rises to a height of 152 ft. 3⅛ in., with the sheaves placed 125 ft. above the collar, is completely covered with galvanized

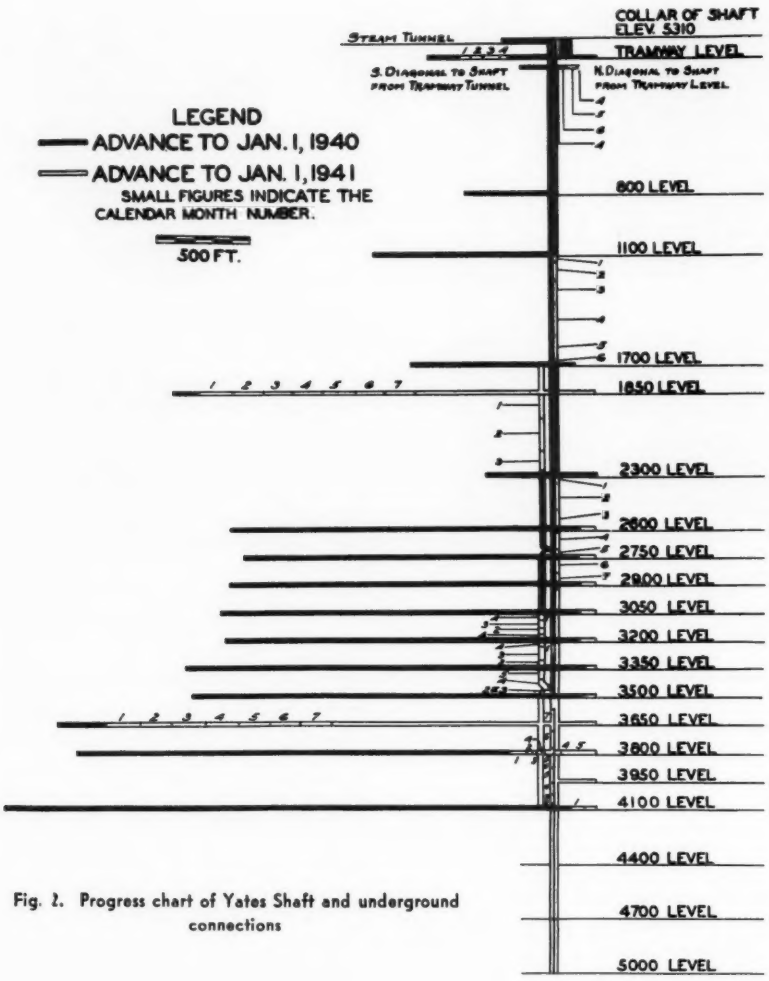


Fig. 2. Progress chart of Yates Shaft and underground connections

iron over structural steel. There were 672 tons of steel used in the headframe and crusher structures. The base of the headframe includes an area 67 ft. 10 in. by 111 ft. 8 in. Owing to its height, it was decided to include a push-button elevator in the headframe to insure more frequent and adequate sheave wheel and superstructure inspection and maintenance. The sheaves, of which there are four at the top elevation, are 14 ft. 0 in. in diameter. A fifth sheave, 9 ft. 0 in. in diameter, is placed 69 ft. 9 in. above the collar for the runabout cage.

The crusher building abuts directly upon the front of the headframe; it is similar in structure but is insulated with 4-in. thick rock wool, held in place by special galvanized iron sheathing.

The roofs of all the principal buildings are flat and are made of pre-cast concrete slabs overlain by 1-in. rigid insulation and 5-ply pitch and gravel.

Hoist Buildings

The main hoist building and motor generator room are of pressed brick and steel construction with concrete slab roofs as heretofore described. The hoist building is 75 x 154 ft. in floor area and has a height of 71 ft. 3 in., including the basement. A 32 x 120-ft. ell from the back of it houses the motor generator equipment. In the basement of the two buildings are located the air, power, water, steam, oil and sewage lines, a small change room, oil and water circulating pumps and the main hoist drum pits. A tunnel connects to the shaft 24 ft. below the collar to carry the necessary pipe and power lines.

A smaller brick hoist building will subsequently be erected between the main hoists and headframe to house the runabout cage hoist which will be moved later from the Ellison shaft when the latter is abandoned.

At the ramp level 24 ft. below the shaft collar all available extra space will be utilized for tool and storage rooms. Ample room is provided in front of the shaft for the men going on and off shift. One tunnel, 12 ft. in width, leads from the ramp past the miners' electric lamp room to the change house, and another leads to the machine shop.

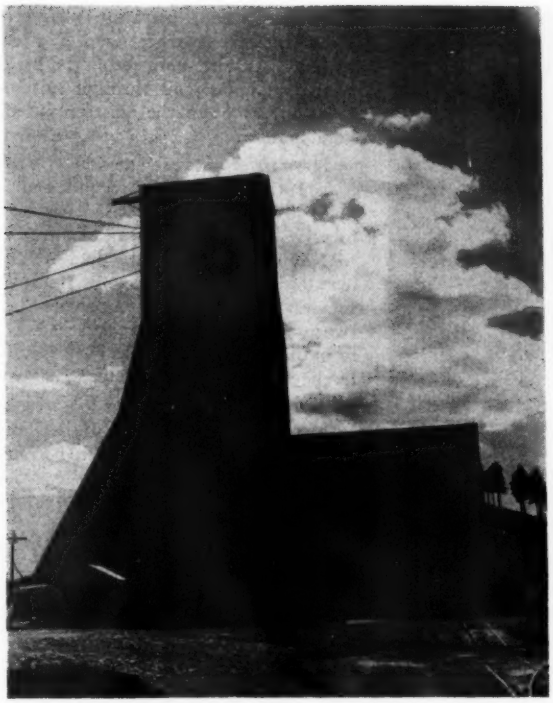
All buildings and tunnels are steam heated, and the shaft collar will be provided with a unit heater to prevent the formation of ice below the collar during the cold winter months.

Other Buildings

The change house located at the end of the tunnel from the ramp will be built of structural steel with pressed brick facing and will comprise three floors, including the basement, with an ultimate capacity of 750 men. Modern lockers, showers and sanitary facilities will be provided, and the connecting tunnel will permit the men to go back and forth to the shaft without outside exposure.

The compressor building will be built of structural steel and reinforced concrete, with a floor area of 50 x 150

Yates headframe and hoist house, including motor generator room, crusher, change house and lamp room. Additional buildings to be erected will house a compressor plant, mine carpenter shop and mine offices



Closeup of Yates headframe and crusher building

ft., and will be equipped with compressors now in use at the Ellison plant. For the present it will have a capacity of 10,300 cu. ft. of free air per minute at 100 lb. pressure and 2,670 cu. ft. of high pressure air.

The completed plant will also include a mine office and carpenter shop.

EQUIPMENT

Hoisting equipment will be modern in every respect. In 1934, for the new Ross installation, a modified application of the by-cylindro conical drum hoist was developed by the Nordberg Company based on Homestake specifications, and two similar hoists with further improvements in design have been installed at the Yates. The hoist drums are grooved to wind 5,600 ft. of 1⅞-in. cable in a single layer and are mounted on 30-in. shafts. The drums are 25 ft. in diameter at the large end and 10 ft. in diameter at the small end.

The Ore Hoist

Weight of each skip with load, 29,000 lbs.
Skips normally in balance.
Maximum drum speed, 39.25 r.p.m.
Accelerating time, 22 secs. at 2,837 ft. to 16 secs. at 5,237 ft.
Retarding time, 16 secs.
Flywheel weight, 135,000 lbs.
Maximum input to flywheel M. G. set, 2,215 hp.

Hoist Motors—
2 1,500-hp., 600-volt, 350-r.p.m., d.-c.

Flywheel M. G. Set—
2 1,250 kw., 600-volt, 720-r.p.m., d.-c. generators.
1 2,000-hp., 2,200-volt, 3-phase, 60-cycle, wound rotor induction motor.
1 30-kw., 250-volt, 720-600-r.p.m. exciter.

Auxiliary Exciter—
1 5-kw., 125-volt, 1,750-r.p.m. exciter.
1 7½-hp., 440-volt, 3-phase, 60-cycle, squirrel-cage induction motor.

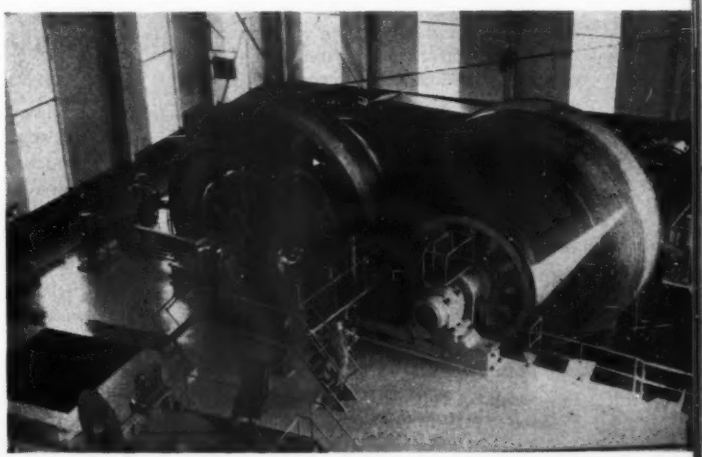
The Man and Material Hoist

Weight of cage and rope, 10,000 lbs.
Total weight with load, 17,200 lbs.
Normally in balance.
Maximum drum speed, 39.25 r.p.m.
Flywheel weight, 96,000 lbs.
Maximum input, M. G. set, 1,415 hp.

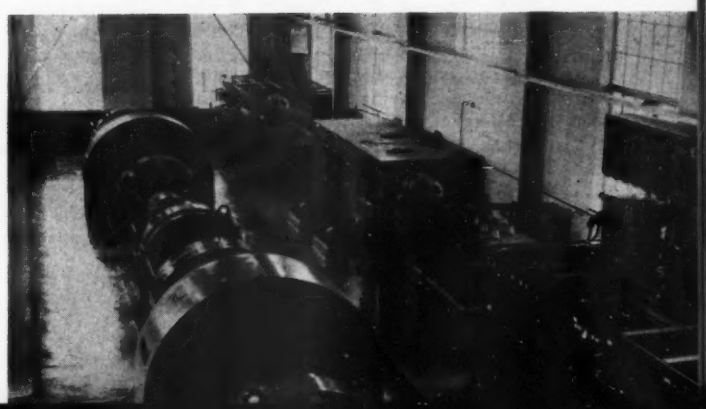
Hoist Motors—
2 1,250-hp., 600-volt, 350-r.p.m. d.-c. motors.

Flywheel M. G. Set—
2 1,000-kw., 600-volt, 720-r.p.m., d.-c. generators.
1 1,000-hp., 2,200-volt, 3-phase, 60-cycle, wound rotor induction motor.
1 30-kw., 250-volt, 720-660-r.p.m. exciter.

The modern flywheel equipment on both M. G. sets will smooth out the



The Yates Hoist drums are grooved to wind 5,600 ft. of 1⅞" cable, are 25 ft. in diameter at large end and 10 ft. at the small end



Motor generator room at the Yates shaft. Modern flywheel equipment on the M.G. sets will smooth out power peaks and materially aid hoist performance

power peaks and materially aid hoist performance. Control of the d.-c. motors is on the variable voltage Ward Leonard system. Automatic slip regulators are used in the secondary circuits of each wound rotor induction motor. Hoist electrical equipment was furnished by the Westinghouse Manufacturing Company. Both hoists are equipped with the latest type of Lilly controls as manufactured by the Logan Engineering Company of Chicago.

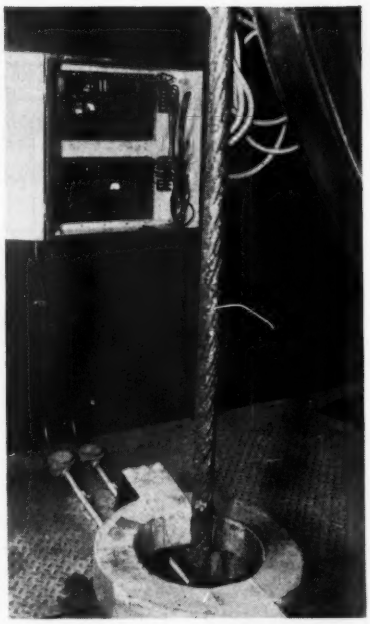
Crusher Equipment

The ore is hoisted to surface and dumped into a small bin in the headframe, from which it is fed into Allis-Chalmers 8 K. gyratory crushers, where it is reduced to 6-in. size, then into 7-ft. Symons short head cone crushers located above the main storage bins for secondary reduction to 1½ in. From the cone crushers the ore is dropped into the 5,000-ton capacity steel rail-lined storage bin, where it is drawn off through an ore pass into chutes at the mill tramway level 125 ft. below the shaft collar.

SIGNAL SYSTEM

The annunciator wire system, as commonly employed for many years in a large number of deep mining operations, has been standard at Homestake until comparatively recently, but is gradually being supplanted by the carrier-current system. The older method, although successful and efficient, is comparatively high in first cost and has several limitations and disadvantages not common to the newer one. The latter method, as developed by Homestake's electrical engineers under the direction of Mr. J. F. Wiggert, was carried on experimentally for several years prior to its recent incorporation as standard equipment.

The carrier-current system makes possible voice or bell signalling from a cage, be it stationary or moving, directly to the hoist engineer or vice versa from the latter to the cage tender. Thus when a cage call is made, the cage is oftentimes in full motion, but the cage tender may stop or change its course if by so doing a trip can be saved, thereby effecting a considerable saving in hoisting time. Oral signal transmission, with its verbal confirmation when necessary, has many obvious advantages, the most important of which is safety. A modification of the carrier-current system is employed to automatically give the hoist engineer a visual signal during caging operations as to whether the cage is on or off the chairs. This added safety feature obviates the lowering of cable while the cage is still on the chairs.



Carrier current coil mounted directly below sheave wheel for shaft signalling system. Note radio equipment in top center of picture

Inasmuch as a detailed technical description of Homestake's carrier-current shaft signalling system is now under preparation for early publication, the major points will be but briefly touched upon here. Current transmission by a metallic conductor (in this case the hoisting cable) between transmitter and receiver is termed a carrier-current system; in older parlance it might be termed wired wireless.

The receiver equipment, including the loud speakers on the cage and at the hoist engineers' stations, is usually connected to receive or reproduce any message transmitted. In transmitting, the microphone switch is closed, but it must be released to receive any words from the loud speaker. A microphone on the cage is connected by suitable apparatus to a coil which is clamped around the hoisting cable just above the cage. The words spoken into the microphone travel to the coil from which they are transmitted onto the cable, which acts as a "carrier" up the shaft. A similar coil mounted around the cable (see illustration) directly below the sheave wheel, acts as a receiver. A wire connection is made from this upper coil through suitable radio apparatus to the hoist engineer's loud speaker.

The carrier-current frequency range is 100 to 200 kc. per second and is quite low as compared with the commercial broadcast range of about 550 to 1,600 kc. per second. In different installations for the same shaft it is necessary to spread frequencies between installations by at least 15 kc. to minimize cross talk and other interferences.

At this time it is impossible to exactly state what savings in initial cost and upkeep are possible with carrier-current as compared with the older annunciator wire system owing to the cost of development and experimentation. Nevertheless, the new method is lower in first cost and should compare favorably in upkeep. Moreover, the distinct advantages gained through greater safety and added efficiency in the handling of the cages leaves no doubt as to the all-around success of this new system of shaft signalling.

Summary

The shaft and surface layout, all of which was designed by Homestake personnel, is so arranged as to best protect the men and at the same time efficiently handle the work. The ready accessibility of the shaft at the ramp level by tunnel to the shops, the change house, storage rooms and hoist will be of great practical value to the operation. The major phase of the project (to the 4,100-ft. level) will be completed by the end of 1940.

Grateful acknowledgment is made to those of the Homestake organization who aided in the gathering of the data herein presented, and especially those who planned and executed the work on this project.

Sales of Mechanical Stokers Increase During June

The Bureau of Census of the Department of Commerce reports that factory sales of mechanical stokers for the month of June amounted to 9,986 units, as compared with 8,415 units in May; 7,943 in June, 1939; and 6,088 units in June, 1938.

Sales for the first six months of this year amounted to 37,396 units and compares with 26,990 and 23,492 units in the same 1939 and 1938 periods respectively.

Development of Sink-and-Float or Heavy Fluid Concentration on the Minnesota Iron Ranges

The Harrison concentrator of Butler Brothers at Cooley, Minnesota, where iron ores from the western Mesabi range are being successfully treated by sink-and-float process, using ferrosilicon as the density medium

By GROVER J. HOLT
Butler Brothers

● ***Cost of Operation and Investment Per Ton Approximate Jig Practice with Results Superior. With More than 1,000,000 Tons Scheduled to be Treated in 1940, the Process Has Passed from Experimental to Full Commercial Scale***

UNTIL 1924 the washing of iron ores in Minnesota depended largely on methods of classification rather than concentration. The only problem present lay in the removal of minus 100 or 200 mesh sand from the coarser iron particles.

In 1924 the Stanley Mining Company, of which Emmett Butler was president, installed the first iron ore jigs in the state. This property produced ore continuously until 1929, when the plant was dismantled and the jigs installed in the Harrison washing plant of Butler Brothers at Cooley, Minn. These jig units together with additional units have been successfully producing concentrates since that time.

The grade of the ore in the properties has continually reduced, and the ores became more difficult to treat even in jigs, as time went on. By 1936 it was evident that some more refined method of concentration was inevitable.

Development of High Density Methods

In 1931, the Chance process of sand flotation on coal was investigated, but the Chance Company were never able to develop their process to fit iron ore requirements. It was not until the fall of 1936 that Victor Rakowsky presented worthwhile evidence that a commercial high density unit involving solid mediums was practical.

In the winter of 1936-1937 a test unit was set up at the Mines Experimental Station, University of Minnesota, and iron and manganiferous iron ores were successfully treated in a 3-ft. diameter test cone. During the summer of 1937 a commercial size unit was built at the Merritt plant at Ironton, Minn., and while metallurgical results were satisfactory, it was found that the galena was difficult to clean properly for returning to the circuit and that it ground up so rapidly that the loss in overflows exceeded the limits of commercial application.

The idea of using a magnetic metallic medium was conceived during the above period and definite tests made as to suspension qualities on crushed steel and ferro-silicon in the early fall of 1937 by Butler Brothers staff in conjunction with Henry Wade of the Mines Experimental Station. During the ensuing test work various shapes of cones were used in small laboratory models, and the inverted top type was found to be the best of several tried.

A 3-ft. diameter cone of this type with complete magnetic recovery flow sheet was used at the Mines Experimental Station, followed by a 4-ft. diameter cone unit with a complete magnetic recovery flow sheet installed at the Patrick plant in the summer of 1938.

This 4-ft cone treated tonnages up to 40 long tons feed per hour and operated all during the shipping season of 1938. As a result of this pilot unit, two cones, 7½ ft. in diameter were installed in the Harrison plant in

1939, capable of treating upwards of 350 long tons per hour. These operated steadily during the shipping season, except for time spent in remodeling the units for the removal of weak points. These units replaced a battery of 60 coarse jig cells.

Comparative Heavy Density and Jig Results

During the 1939 season, no comparative results were obtained in direct competition between the two methods since the heavy density plant operated solely as a production unit.

In 1938, however, the pilot unit utilized identically the same feed as was treated in the jig plant with result shown in Table I.

TABLE I. COMPARATIVE RESULTS OBTAINED FROM CONE AND JIG UNITS FROM IDENTICAL FEED

Ave. Sp. Gr.	Cone Unit: % Wt. Recy.	Cone Unit: Concentrates % Fe	Cone Unit: Concentrates % Si	Cone Unit: Tailings % Fe	Cone Unit: Tailings % Si	Jig Unit: % Wt. Recy.	Jig Unit: Jig Conc. % Fe	Jig Unit: Jig Conc. % Si	Jig Unit: Jig Tails % Fe	Jig Unit: Jig Tails % Si
2.90	88.91	55.75	11.89	21.91	60.23	71.05	55.46	12.01	41.57	31.20
3.00	85.10	57.42	9.56	31.98	44.08	79.90	56.04	11.54	40.75	34.08
3.05	80.20	58.26	9.05	36.97	37.91	66.88	57.76	9.91	46.48	24.53

COMPARISON OF ABOVE RESULTS

Ave. Sp. Gr.	% Increased Recovery High Density	High Density Conc. Increased % Fe over Jigs	High Density Conc. Decreased % Si under Jigs	High Density Tails Decreased % Fe under Jigs	High Density Tails Increased % Si over Jigs
2.90	17.81	0.29	1.20	19.66	29.03
3.00	5.20	1.38	1.98	8.77	10.00
3.05	13.30	0.50	0.86	9.51	13.38
Weighted average	13.40	0.62	0.83	12.80	18.22

The ores treated in these tests over a three-month period varied widely but in every case the feed to the two units came from the same feed conveyor belt.

Sink and float tests conducted on the cone concentrates produced showed less than 0.5 percent of float material, all fine size middlings. The cone tails showed less than 2 percent of sink which were also a middling product.

Sink and float tests on jig concentrates showed from 6 percent to 9 percent of float material, and jig tailings from 45 percent to 50 percent of sink at the gravities at which the cone was operating.

Description of Medium

Several crushed ferro-alloys were tested, but ferro-silicon containing about 83 percent Fe, 14-15 percent Si and ½ percent of carbon and non-magnetics was selected due to its high specific gravity, resistance to oxidation and desirable magnetic qualities of susceptibility and permeability. Fifteen percent ferro-silicon was also the most economical, from the first cost standpoint, of any of the metals and alloys used combining the above characteristics. For specific purposes, however, other of the alloys may be used.

Fifteen percent ferro-silicon has a specific gravity of from 6.7 to 7.0, is extremely hard (from 5 to 6 in Moh's scale), and can only be crushed by heavy impact in ball or rod mills, usually dry, using air swept mills. Ferro-silicon from both electric and blast furnaces has been used, and no apparent difference noted in results. If the silicon content increases above 15 percent, the magnetic qualities decrease, and if the silicon content decreases below 15 percent, the resistance to oxidation is lowered.

The particle size of the ferro-silicon used is preferably minus 65 mesh with about 96 percent minus 100 mesh and about 65 percent minus 200 mesh. In practice, the material is mixed with water to give the desired gravity for the purposes of separation, and the gravity changed at will by regulation of the water content of the pulp.

Gravities of from 2.5 to 3.4 are attainable, and in practice a rule has been quite well established that in a solid-water medium the maximum *workable gravity* that can be attained is about one-half the specific gravity of the solid particles used to make up the medium. From this it is evident that the medium must be kept clean by removal of light quartz and clay particles in order to work at high specific gravities. This cleaning is easily done by magnetic separators.

Table II shows the specific gravities of ferro-silicon medium containing varying percentages of solids by weight.

Due to the fact that the solids are hard to keep in suspension below 70 percent solids by weight, operation at gravities less than 2.5 is not recommended. A high limit of specific gravity with 15 percent ferro-silicon would be from 3.40 to 3.50, since above this point viscosity would increase beyond the point of operating possibility even with a clean medium. Some alloy of higher specific gravity should be selected for higher gravities than 3.4, such as crushed steel treated to prevent oxidation. Reagents to reduce the viscosity of pulps are being considered to attain higher working gravities.

TABLE II. FERRO-SILICON MEDIUM BASED ON MEDIUM USED IN OPERATION

Specific Gravity	Percent Solids	Pounds Solids Per Cu. Ft.
1	0	0
1.03	5	3
1.07	10	7
1.12	15	11
1.17	20	15
1.23	25	20
1.30	30	26
1.39	35	32
1.50	40	38
1.62	45	45
1.89	55	64
1.74	50	54
2.05	60	74
2.24	65	87
2.48	70	105
2.78	75	127
3.17	80	155
3.62	85	195
4.23	90	250
5.20	95	325
6.70	100	418

Recovery of Medium Solids

Non-magnetic mediums must be cleaned by gravity or flotation methods, and in the fine particle sizes used this becomes difficult. A magnetic medium may be thickened prior to cleaning much more easily than the non-magnetic mediums. This is accomplished by passing the wash water carrying the medium and ore particles through a direct current magnetizing coil or by the use of Alnico permanent magnets.

In passing through this coil or between the permanent magnetic blocks, the magnetic medium particles become magnets on a small scale, and the finer particles adhere to the larger particles, thus making the settling action much more rapid.

The magnetic separators or cleaners are set for the proper field strength, and the cleaning becomes automatic without reliance on the human element required in gravity or flotation cleaning methods. Cleaning continues up to maximum efficiency so long as power is uninterrupted.

The medium remains magnetized throughout the cleaning circuit and is

only demagnetized by flowing through an alternating current coil just before being returned to the circuit.

This method of cleaning can be controlled with selected medium solids to the point where even natural magnetite may be rejected and the medium solids recovered.

Efficiency of the Process

A true specific gravity separation has been the aim of development in all forms of jigs, tables and other gravity concentration equipment. This process does not depend upon the laws of either free or hindered settling ratios of mineral and gangue. Other methods depending upon these laws are found to be affected by size and shape of particles, as well as ratios of concentration which require adjustment even in ores which are similar in structure.

Structure of the ore, which can only be improved by finer crushing, is the only factor which need be compensated for in a true sink-and-float separation.

Variations in rate of feed to a sink-and-float unit have no effect on the separation made provided such feed rate does not exceed the rated capacity of the unit. In a plant designed for 150 tons per hour a feed rate of one ton per hour results in as perfect a separation as is attained at maximum rated capacity.

Many refinements in connection with high density sink-and-float operation have been worked out on a commercial scale such as:

1. Pumps for circulating medium to replace bucket elevators which are costly to maintain.
2. Screw type classifiers for the thickening of cleaned medium before returning it to the circuit.
3. Installation of Massco density indicators to measure and control the specific gravity of the medium continuously and accurately. This eliminates the necessity of weighing known volumes of medium.
4. Subsurface feeding of the ore into the medium and elimination of excess moisture in the washed feed. In subsurface feeding the water is squeezed from the particle surface and rises in the feed chute and can be eliminated by means of drain pipes.

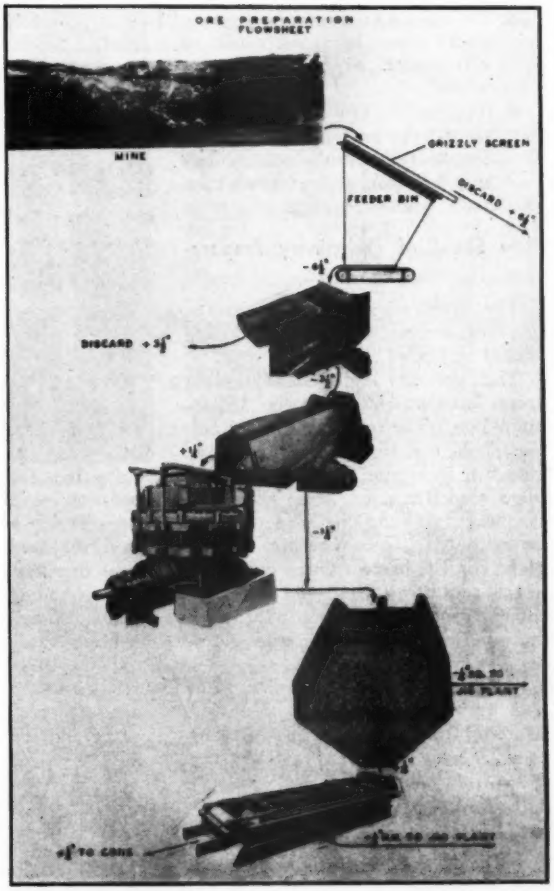


Fig. 1
Simplified diagrammatic representation of ore preparation flowsheet

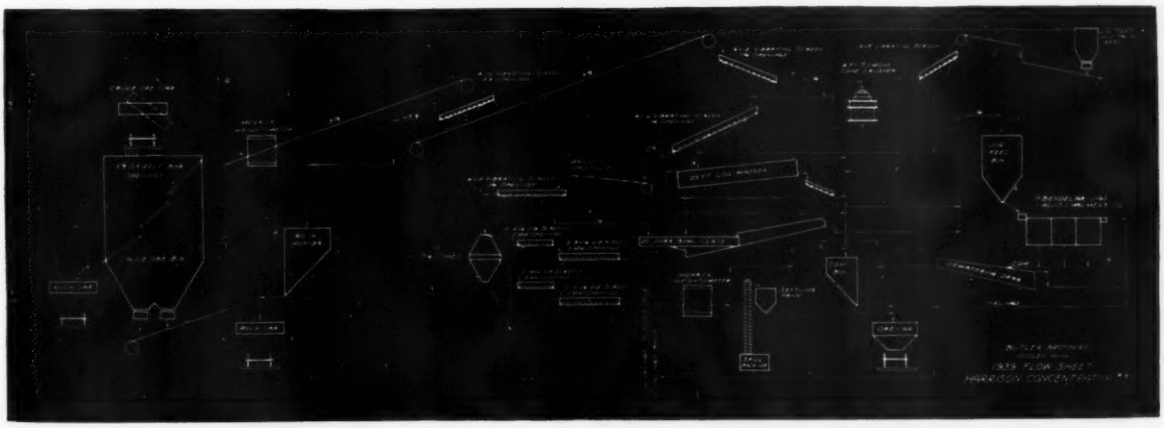


Fig. 2. Detailed flowsheet of entire ore preparation and concentration process at the Harrison plant

5. Drainage and washing screen decks have been perfected to eliminate high maintenance costs.
6. The entire process and equipment have been developed along practical lines to eliminate human element and guesswork so far as possible.

Flow Sheet of Preliminary Preparation Plant

The preparation plant consists of grizzlies, screens, a cone crusher, log washer and bowl classifier.

The present high density plant treats iron ore sized between 1¼-in. and ¼-in. The minus ¼-in. ore collected in the log washer and bowl classifier is treated in a modern jig plant consisting of seven Bendelari diaphragm jigs and one Wade or Conset air pulsated jig. The high density plant consists of two units, each having a separating cone and necessary screens, medium circulating pumps and medium reclamation and cleaning circuits.

Ore enters the high density plant over a 30-in. belt conveyor capable of handling the feed rate of 400 long tons per hour. The head pulley of this conveyor is equipped with a magnetic head pulley for the removal of tramp iron. A 5 x 14-ft. Robins Eliptex screen having a ¼-in. screen deck receives the feed, which is washed by means of sprays for the final removal of slime and sands. These sands join the fines to the bowl classifier and the oversize is ready for cone treatment.

Feed to the high density plant passes over this Eliptex Screen where it is washed by sprays for final removal of slime and sands

The ore is discharged from the screen into six rectangular chutes, three of which feed each cone subsurface and are used for water drainage, as described previously. The cones are constructed by using an inverted truncated cone for the top half and a truncated cone for the lower half, as shown in Fig. 3. The separating zone in the cone is a comparatively narrow horizontal band near the top of the cone. Separation of products is almost instantaneous, with tailings rising to the lip of the upper inverted cone and flowing over the lip of the cone with excess medium and concentrates sinking to the air lift at the bottom of the lower cone.

Medium enters the cone through

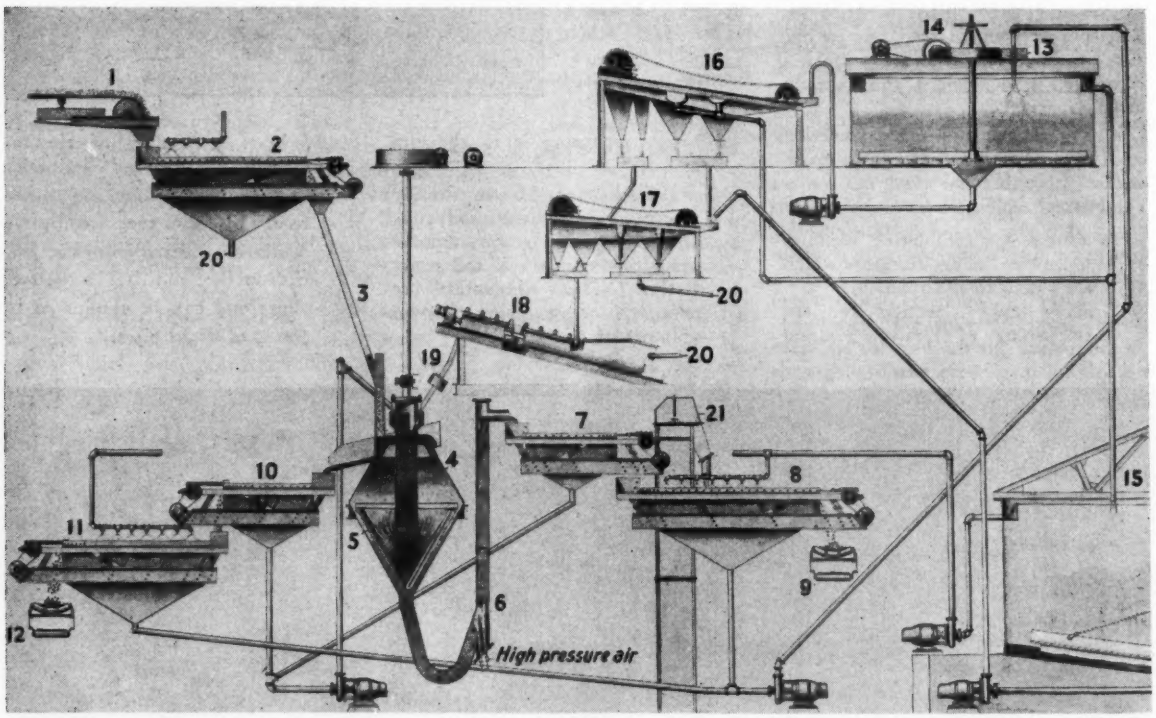


Fig. 3

1. Crushed Ore, Roughed Washed & Screened
2. Washing Screen
3. Size Washed Feed
4. Cone Separator
5. Agitator
6. Concentrate Airlift
7. Concentrate Drainage Screen
8. Concentrate Wash Screen
9. Cone Concentrates
10. Tailing Drainage Screen
11. Tailing Wash Screen
12. Cone Tailings
13. Magnetizer
14. Thickener
15. Clarification Tank
16. Roughing Magnetic Separator
17. Finishing Magnetic Separator
18. Reclaimed Medium Supply
19. Demagnetizer
20. To Jig Plant
21. Clean-Up & New Medium Elevator

Operating floor at top of cones. Medium enters the cone through 6" central pipe, and ore enters through chute at side of cone, feeding into medium below its surface

the central pipe which is 6 inches in diameter, and by means of a drive mounted above the cone this pipe acts also as a drive for the blades which rake concentrates down the 60-degree cone bottom to the air lift. Medium enters this pipe above the top of the cone by means of a funnel construction and slots in the pipe, and is discharged through slots near the bottom as well as the open bottom of the pipe. The medium from the slots travels up to discharge with the tailings, and from the open pipe bottom travels down to enter the concentrate air lift. The rising medium keeps the cone clear of middlings accumulations.

Tailings overflowing with excess medium flow onto 4 x 6-ft. Nordberg flat deck vibrating screens decked with 2 mm. punched plates. Concentrates discharged with excess medium flow onto 4 x 6-ft. Nordberg screens duplicates of those used on tailings. The decks are also 2 mm. punched plate screens.

The excess medium from both concentrate and tailing drainage screens passes into surge tanks and is drawn off by 8-in. Wilfley manganese lined pumps, to be returned to the cone as shown on the flow sheet.

Washing Screens

The ore and waste particles leave the drainage screens coated with ferro-silicon, and water sprays wash the ore and waste clean. The ferro-silicon and water, together with some fine ore, pass through the 2 mm. punched plate decks into sumps. The concentrate washing screens are 5 x 16 ft. and the tailings washing screens are 4 x 16-ft. Nordberg flat deck vibrating screens.

Wash water and solids from the above sumps are pumped to the cleaning circuit by means of Hydroseal rubber lined pumps.

Magnetizing Blocks

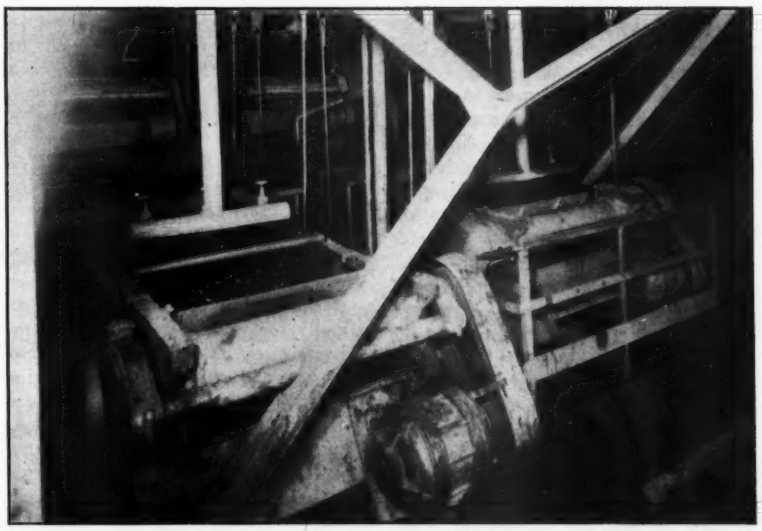
The pump lines discharge through stainless steel nozzles on either side of which are boxes, each of which contains two pairs of Alnico blocks arranged for polarity so that the flow of material from the pump line penetrates two concentrated magnetic fields. In so doing, a polarity is established in each ferro-silicon particle. This causes a flocculation of particles with resultant rapid settling.

Primary Thickeners

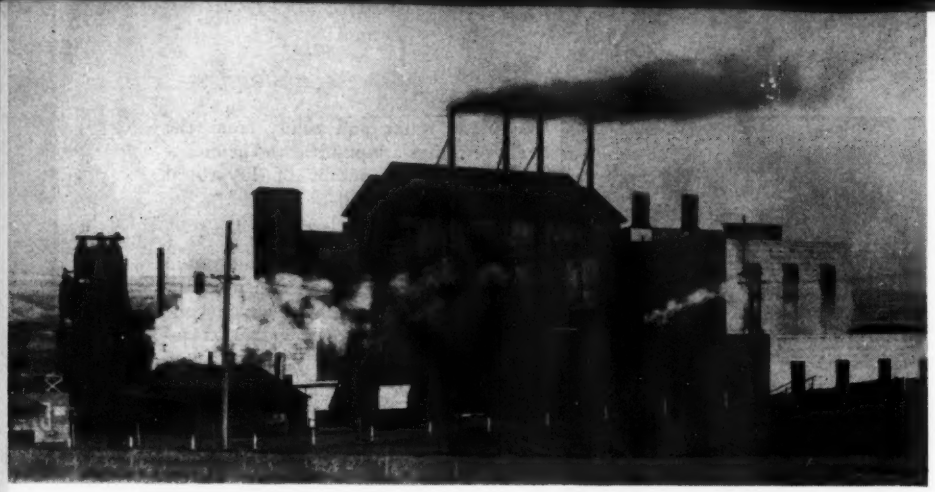
The magnetized material is settled in Eimco 16-ft. diameter thickeners, the overflow of which passes to the 50-ft. thickener outside the plant. The wash water entering the thick-

(*Continued on page* 64)

Basement view showing cone bottoms and air lifts. Concentrates sink to bottom of cones into the air lifts, thence are raised to concentrate drainage screens



Medium drainage screens (top left) and washing screens (center)



Briquetting plant at Dickinson, North Dakota

LIGNITE PROGRESSES—Future Promising

● ***Past 25 Years Marked By Notable Advances in Efficient Production. Future Hinges on Briquetting and Expanded Markets for By-Products***

"BROWN!" "Woody!" "Looks like peat!" "Not much better than buffalo chips!" "No commercial value!" "Way out in North Dakota!" "Fifty percent water!"

Such were the comments if you asked about lignite 25 years ago. There were only a few thousand tons produced, all of it from "Gopher Holes," mostly for local use. Little was shipped and little was used in industrial or steam plants.

Today the picture is different. The high quality lignites have been found, and large mines have been developed. No longer can they say "Brown!" "Fifty percent water!" It is a valuable coal now—a true lignite, but approaching a sub-bituminous coal. Low in moisture, high in heat, black, shiny, nice appearing, a coal that is prepared well and sold in the markets of the Northwest to satisfy a real need.

In 1939 the North Dakota lignite mines produced something over two million tons, the larger part of which is shipped by rail to consumers in North Dakota, South Dakota and Minnesota. This coal went to homes, schools, factories, railroads and utilities. Approximately 50 percent of the tonnage is prepared coal. Although there are a number of small mines in the state (the last coal mine inspector's report shows 326), yet approximately 95 percent of the tonnage shipped is from five companies.

There is no prospective shortage of lignite, as the entire western half of the State is covered by many beds varying from 2 to 15 ft. in thickness. It is estimated that there are at least 695 billion tons available or enough to supply the world at the present rate of consumption for over 100 years. The coal lies in horizontal layers and it is very seldom that there is any pronounced tilting of these beds.

Best Coal Near Surface

Strange as it may seem, the best coal is found nearest the surface, whereas seams deeper in the earth are high in moisture content. The overburden in the entire field is a blue clay mixed with some sand and small rocks. All except one of the large mines are strip pits and the average dirt moved is about 40 to 45 ft. Apparently the North Dakota lignite was formed late in geologic history. Indications are that it is of recent Cretaceous or Tertiary age. No great pressure or heat comparable to that of the bituminous or anthracite region has been exerted in this field. Now and then we find delicate fern imprints or tiny animal skeletons in the coal. Throughout the western section of the state petrified tree trunks are sometimes found. Except for these occasional impurities the beds are usually free of any extraneous matter. There is seldom any slate. The coal beds are solid and not banded with impurities. An average proximate analysis of lignite is as follows:

Moisture	33.40
Volatile	28.10
Carbon	32.10
Ash	6.40
B. T. U.	7200.

By W. B. PRATT
Treasurer
Dakota Collieries Co.

Underground Mines Mechanized

The underground mines offer excellent working conditions. The roof is good and it is not necessary to timber except to the very minimum. The men can work standing upright and in comfort. Because of the height of the seams, the larger types of equip-

ment can be used, such as the Joy and Goodman machines. Cars can be large and the entire production can be on a completely mechanized basis. There are no inflammable gas pockets and it is very easy to ventilate these mines.

The one large underground mine is completely mechanized, using track mounted cutting and loading machines, operating in a seam of lignite coal which varies in thickness from 18 to 22 feet. The double-entry system of mining is used with both main and cross entries driven 15 to 17 ft. in width. The panels are 350 ft. wide by 1,200 ft. deep, and when completely developed contain 26 rooms, driven in one direction only from the cross entries. The rooms are driven 26 ft. in width on 40-ft. centers, with pillars 14 to 16 ft. in thickness. Pellet powder is used in blasting all of the coal. All shots are fired at night. The haulage from the cross entries to the main parting is done with 8-ton locomotives, and from the main entry parting to the outside the haulage is handled with a 15-ton main-line locomotive. The last stage in the haulage system—the two-mile haul from the mine mouth to the tipple—is handled by a 20-ton locomotive, each trip consisting of from 40 to 46 three-ton cars.

Strip Mines

The strip mines use fairly large equipment, although they have not gone as yet to the extremely large machines used in Central Illinois and Kansas. Generally 6 and 8-yard shovels are used to strip the overburden, often in conjunction with a smaller dragline. The coal is dug with ½ to 2-yard shovels, depending on the depth and quality of the coal. The equipment is usually steam or electric although the trend seems to be to electrify the mines as far as possible. This is undoubtedly due to the alkalinity of the water and the fact that it has to be treated for use in steam equipment.

The coal is usually cut on a vertical plane so that the ledge has a square face. This permits a larger recovery of stripped coal and reduces cost of shooting. It makes it easier for the digging shovel, and also saves coal that might otherwise be lost in the next cut.

So far, most of the lignite is being hauled from the mines to the tipple by narrow gauge equipment. The haul will vary from 1¼ to 3 or 4 miles. Except for the small truck mines none of the operators are using trucking equipment for hauling. It may be that in the near future the narrow gauge will be discontinued and trucks put in use.

Preparation Plants

Some of the newest preparation plants are in North Dakota. One of the pictures shows a preparation plant at the only large underground mine. This tipple is barely three years old and was built by McNally-Pittsburg Company especially for this operation. There are no washing plants, as the lack of impurities makes washing unnecessary. The tipple usually consists of four or more loading tracks, supplying six or seven sizes of coal. Domestic sizes are loaded in box cars with an average load of 30 tons. There are a few gondolas in use, but the only users that can handle this equipment are utilities, industries, and state institutions. Electric box-car loaders are in general use.

Expanding Market

The market for lignite was originally within 5 or 6 miles of the mine, but it has gradually expanded with modern methods and better preparation until today it covers all of North Dakota, a considerable part of South Dakota and western Minnesota. Lignite was originally used only in homes because it was a cheap fuel, especially in farm communities where economy is necessary. Today the real value of lignite is becoming known and the better beds of coal have supplied to the domestic and industrial users a much greater value for their dollar. Until recently many of the utilities and industrial plants on the borders of North Dakota used eastern coal instead of lignite; however, steady gains have been made by the lignite operators in introducing lignite until today few plants in North Dakota are still using bituminous coal and sales are gradually extending to Minnesota and South Dakota. The freight rates are low, mine prices low and the rail service is dependable. There are four transcontinental railroads serving this territory, and they all offer good freight service.

Typical Lignite strip pit of North Dakota

Trucking

Truck competition is limited; however, there is some trucking done by people who attempt to make a living by that means, but not on a large or organized scale. Trucking, except to points adjoining the mine, is unprofitable. Probably one of the most important causes of trucking lignite during the past few years has been the failure of crops in the western area where the mines are located; and the need for transfer of stock food from the eastern area to the western formed a distributing agency. Lignite furnished a return load for the truck. This caused considerable truck distribution in areas between 50 and 150 miles from the mines. Failure of crops also meant that many farmers and small town truck owners were without means of existence, and their attention was attracted to the possibility of making a bare living by transporting and delivering to the consumer. Careful study of the situation in North Dakota leads inevitably to the conclusion that trucking of lignite on a large scale cannot be made profitable. Small mine owners who have heretofore supplied the trucking trade at a low price are realizing that prices must be advanced if they are to live and prosper. The attitude of these small mine operators will also have an important bearing on the future trucking of lignite.

What About the Future?

This article attempts to cover briefly some of the high points in the lignite industry as it is today. Great progress has been shown during the past 25 years, but it has been entirely in the production end and improvement of the coal. The future of the industry lies not in the supplying of more coal to an ever increasing local market, but its use along productive lines outside the Dakotas.

Modern tipple at underground mine

To secure these markets, the one great handicap of lignite—its moisture—must be wholly or partially eliminated. Dehydration is the unsolved problem. We can hope to gain very little in the present marketing area. There is little possibility of new industries being developed, and the population certainly will not increase to any great extent. The natural area for sale of lignite is almost entirely agricultural and not manufacturing. Except for Minneapolis and St. Paul, which are on the far eastern edge of the region and consequently very competitive, we have no manufacturing areas of any size.

Briquets from Lignite

We must look forward to the development of lignite to secure other raw materials to be used in the manufacturing process. At the present time lignite is being briquetted by the Lehigh Briquetting Company plant near Dickinson, N. Dak. They are using the "Lurgi" process and are producing a very satisfactory fuel. This process, however, produces many by-products which as yet cannot be disposed of profitably. The coal at Lehigh is produced from their own mine beneath the plant and is carbonized by passing it through various heating zones—each zone being higher in temperature and consequently driving off moisture and gases. This carbonized lignite is then ground to a small size, mixed with an asphalt binder, and briquetted under a pressure of 5,000 lbs. per square inch. The resulting fuel is very satisfactory from the consumer's viewpoint. In this process there are certain by-products such as creosote, oils and gases that must be sold to make the plant operate efficiently and economically. Because of the location this is difficult. There is at the present time another briquetting plant being developed at Minot, N. Dak.

The plastic industry which is developing so rapidly has seriously considered the use of lignite by-products in certain plastics. If this should develop to any extent, lignite will become a very important and economical source of these raw materials. There are various other products that may be produced such as gasoline, oil, asphalt, activated carbon, dyes, etc.

In order to hold the lignite business many of the dealers are selling stokers. These sales create a market for fine coal to be sold to homes and hotels, and also forestall gas and oil competition. Because of the poor crops during the past few years and the low income of most of the people there are very few oil burners in the state. It has been rumored for some time that gas will take the place of other fuel, and in doing so take away a large part of the market for lignite. This is rather difficult to vision because of the very scarce population and the low income.

The miners of North Dakota are practically all natives. In a good many cases farming is done during the summer and the men work in the mine in the winter. Lignite is a seasonal industry and certainly this plan of operation works very well. Accordingly there is very little labor trouble.

The lignite industry is new and growing. There is a great future here, much greater than in the older and more competitive fields. But lignite cannot be used economically in the raw state. The by-products are the real values.

Employment and Accidents at Metallurgical Plants in the United States in 1938

The metallurgical industry had a lower and therefore a more favorable accident-frequency rate in 1938 than in 1937, it is revealed in final reports to the Bureau of Mines, United States Department of the Interior, from companies operating ore-dressing plants, smelters, and their respective auxiliary works. The reports also showed a smaller volume of employment than in 1937. It should be noted, however, that employment was at a higher level in 1937 than in any year since 1929.

Reports for ore-dressing plants covered concentrators, stamp mills, sampling works, slime plants, and lixiviation, leaching, cyanide, and flotation mills. Those for smelters included blast, reverberatory, and roasting furnaces, convertors, casting departments, and refineries. Auxiliary works included yards, shops, and construction work.

Combined figures covering ore-dressing plants, smelters, and their respective auxiliary works showed a decrease of 18 percent in number of workers and a decrease of 23 percent in number of man-hours worked, compared with 1937. A total of 39,043 employes was reported for 1938, a decrease of 8,487 from the number of men at work in 1937. The number of man-hours worked in 1938 was slightly more than 90 million, compared with more than 117 million in 1937.

Accidents during 1938 killed 41 men and injured 2,293 men, representing a combined rate of 25.47 accidents per million man-hours of employment. This rate compared favorably with the rate of 27.72 for 1937.

Manganese Plant to Be Enlarged

The plant of the Cuban-American Manganese Company, controlled by the Freeport Sulphur Company, is to be increased by one-third by January 1, 1941, as a national defense measure, according to an announcement by the company.

L. M. Williams, Jr., president of the Cuban-American Manganese Company, stated that the capacity of the plant at Cristo, Cuba, would be stepped up from 100,000 tons to 130,000 tons a year.

The Metals Reserve Company has contracted with the Cuban-American Manganese Company for 25,000 to 65,000 tons of ferro-grade ore annually in 1941, 1942 and 1943. This contract is part of the Government program to acquire a store of strategic materials necessary to the national defense program.

Colorado Springs

The Focal Point of Metal Mining

IN THE shadows of the majestic heights of Pike's Peak some 2,000 mining men will meet for their 7th Annual Metal Mining Convention and Exposition from September 16 to 19. Throughout the mining areas of the West and in fact throughout the nation the password to progress is "Follow the Gold Rush Trail to Colorado Springs for the A. M. C. meeting."

Final plans are being concluded under the leadership of J. C. Kinnear, National Program Committee Chairman, and active guidance of Merrill E. Shoup, Chairman of the Western Division, and Howard I. Young, President of the American Mining Congress.

An outstanding program covering subjects of deep significance to mining and to the nation's defense program—exhibits of mine equipment and supplies featuring developments for boosting efficiency of operation—and unexcelled entertainment fare have been arranged for the meeting after diligent work on the part of convention committees.

The convention and exposition will get under way at 9 o'clock Monday morning, September 16, at which time delegates will begin to register and to inspect the many splendid exhibits prior to the initial session which will convene at 10:15.

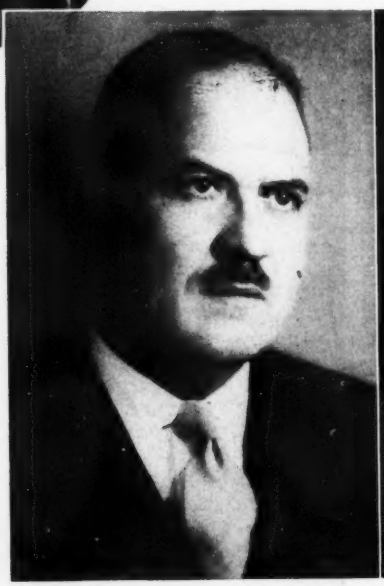
Vital Problems Scheduled for Consideration

Assisting Chairman Kinnear of the Program Committee in planning a series of discussions on vital problems—of minerals in the national defense program, economics, taxation, labor, mine operation, fiscal policies, health and safety, etc.—are the state and district chairmen and members shown on pages 36 and 37. Careful reading of the final program on pages 40 and 41 attests to the success of the committee on its efforts to select timely subjects and prominent leaders to discuss them, thereby insuring profitably occupied hours for all convention visitors.

It will be noted that the nine sessions will be devoted to the following important subjects: Monday morning, Health and Safety; Monday afternoon, Minerals in the Present Emergency; a general session Tuesday morning, embracing questions of the Industrial Uses of Silver, Public Mineral Land Withdrawals, and Public Relations of the Metal Mining Industry; two separate sessions on operating problems Tuesday afternoon—"A" on Geology and Mining and "B" on Milling, Placer Mining and Gold Recovery; Wednesday morning, Taxation; Wednesday afternoon, Wage-Hour Legislation—Mining Loans and the famed Carlton Tunnel; Thursday morning, Labor Problems, Fiscal and Monetary Questions; and Thursday afternoon, the War's Effect on Metal Mining. While all of the addresses at these sessions and the open discussions which will follow are of vital importance to

Seven Falls in
So. Cheyenne Canyon

HOWARD I. YOUNG
President
American Mining Congress



MERRILL E. SHOUP, Chairman
Western Division
American Mining Congress

J. C. KINNEAR
General Chairman
Program Committee

JULIAN D. CONOVER
Secretary
American Mining Congress

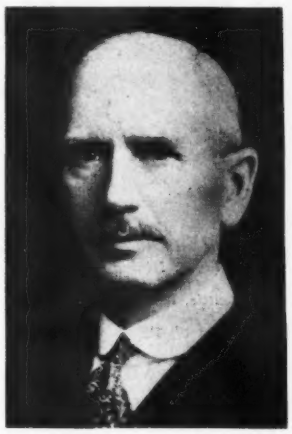
present-day mine management, special interest will no doubt attach to the role of minerals in the nation's defense program. Now that the National Defense Commission has begun to push measures calling for increasing use of minerals, including both the strategic and the more common metals, the industry will be looking forward to united action in support of this program. Convention attendants will be extremely fortunate in hearing C. K. Leith, mineral advisor to the Defense Commission, discuss various aspects of the problems imposed by present critical world conditions. No less interesting will be the discussions of strategic mineral procurement by Elmer W. Pehrson, mining engineer, U. S. Bureau of Mines, and of stimulating domestic production of war minerals by J. R. Van Fleet, vice president of the U. S. Vanadium Corporation.

A review of the war's effect on supplies, international movements, domestic markets and prices for copper, lead, zinc, iron ore, gold, silver, mercury, and tungsten will also command the industry's thought. These will be reviewed by prominent leaders in their fields, including D. M. Kelly, E. R. Dondorf, Jean McCallum, Howard I. Young, H. L. Pierce, Worthen Bradley, Charles H. Segerstrom, and others.

Present active interest in loans to mining will draw unusual attention to the address by Senator James Murray of Montana on "Expansion of R. F. C. Loans for Mining."

With labor relations commanding consideration on the part of industry, government and the public, the addresses on labor problems will undoubtedly bring capacity crowds. A trio of leading authorities—Colonel Philip B. Fleming, Wage Hour Administrator; Edmund M. Toland, special counsel to the congressional committee investigating the National Labor Relations Board; and C. S. Ching, Director of Industrial and Public Relations, U. S. Rubber Company—will be on hand to explain the latest developments in government administration of labor laws and present-day industrial relations. Their addresses will be followed by discussions by D. D. Moffat, H. M. Lavender, H. L. Faulkner, and Edgar T. Zook.

Other prominent men who will participate in the sessions include: Andrew Fletcher, Stanly A. Easton, G. J. Barrett, D. F. Donovan, H. A. Walker, Evan Just, Robert Linton, H. C. Parmelee, Alexander Goetz, Richard L. Neuberger, Robert S. Palmer, Victor J. Hayek, Carl J. Trauerman, Charles F. Willis, Ira B. Joralemon, Edward Thornton, George M. Fowler, Francis A. Thomson, Robert S. Lewis, F. S. McNicholas, Robert W. Thomas, J. Wilbur Van Evera, J. J. Curzon, Bancroft Gore, Elmer Isern, Patrick Butler, Max W. Bowen, T. G. Chapman, Charles M. Romanowitz, Herbert A. Sawin, E. B. DeGolia, W. H. Cullers, Ellsworth C. Alvord, Arthur L. Baldwin, Donald A. Callahan, A. G. Mackenzie, Robert M. Searls, and A. H. Bebee.



JESSE F. McDONALD

President, Colorado Mining Association and Governor, Colorado Chapter, American Mining Congress

ROBERT S. PALMER

Secretary, Colorado Mining Association and Secretary, Colorado Chapter, American Mining Congress

One of the innovations in this year's program will be the showing of a motion picture, "The Homestake Saga," which exemplifies the fine work being done by metal mining companies to promote a better public understanding of the industry's many complex problems.

The program has been arranged to afford plenty of time for floor discussions of all papers and all who have had experience with any of the subjects are invited to express their views.

A principal function of the meeting, closely related to the program, is the formulation of a Declaration of Policy—a statement of the industry's views on national questions confronting it at the present time. The Resolutions Committee will present its report at the final session of the convention Thursday afternoon.

Final Arrangements Completed

Detailed plans, whipped into final shape by the local committees after months of careful work, will assure convention guests a week of pleasantly occupied hours. Contributing to the success of these plans are the following committee chairmen: Local and State Finance, Merrill E. Shoup; Ladies, Mrs. A. E. Carlton; Ladies Entertainment, Mrs. A. C. Magruder; Reception, W. I. Howbert; Entertainment, Russell D. Law; Hotels, George Keener; Trips, George H. Rupp; Publicity, Ernest Nowels; Transportation, J. A. Knight; and General, Russell D. Law.

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Newmont Mining Corp.

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Yuba Cons. Gold Fields.

E. A. WILTSEE
San Francisco.

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BYRON WILSON
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Bradley Mining Co.

D. A. CALLAHAN
Wallace.

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Butler Brothers.

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PERRY G. HARRISON
Evergreen Mines Co.

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WM. R. CHEDSEY
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Hegeler Zinc Co.

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Illinois State Geological Survey Div.

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University of Wisconsin.

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American Smelting & Refining Co.

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Golden Messenger Corp.

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Moorlight Mining Co.

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Mining Eng., Butte.

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Standard Silver-Lead.

TOM L. PITTMAN
Met. Engr., Lewiston.

Mississippi Valley

JEAN McCALLUM
St. Louis Smelting & Refining Works National Lead Co.

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Anaconda Copper Mining Co.

Nevada

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Getchell Mine, Inc.

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Sumpter Valley Dredging Co.

Alaska

H. L. FAULKNER
Alaska Miners Association

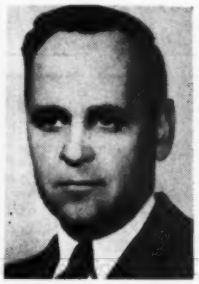
Arizona

H. M. LAVENDER
Phelps Dodge Corp.

California

E. B. DeGOLIA
Gold Hill Dredging Co.

Colorado



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Idaho

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Hecla Mining Co.

Lake Superior

CARL ZAPFFE
Northern Pacific Rwy. Co.

R. P. PORTER
Porter & Co.

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Winston Bros.

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Norris.

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Montana School of Mines.

CARL J. TRAUERMAN
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NEVADA

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Getchell Mine. Inc.

OTT F. HEIZER
Nevada-Massachusetts Co.

JOHN JANNEY
Pioche Mines Consolidated.

H. A. JOHNSON
Tonopah Mining Co. of Nevada.

J. J. LILLIE
Mountain City Copper Co.

HENRY M. RIVES
Nevada Mine Operators Assn.

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Peerless Mine.

C. S. ELAYER
American Smelting & Refining Co.

R. M. MAGRAW
Potash Co. of America.

HORACE MOSES
Chino Mines Div., Nevada Cons. Copper Corp.

ROBERT P. RASKOB
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A. S. WALTER
New Mexico Miners and Prospectors Assn.

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Wright, Dolbear & Co.

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Southern Phosphate Corp.

D. F. HALEY
Climax Molybdenum Co.

D. H. McLAUGHLIN
Harvard University.

H. C. PARMELEE
Engineering & Mining Journal.

EDGAR L. ROSSIN
Miami Copper Co.

SCOTT TURNER
New York, N. Y.

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Cornucopia Gold Mines.

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SOUTH DAKOTA

NORMAN P. GOODRICH
Bald Mountain Mining Co.

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Jane E. Mining Co.

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National Tunnel & Mines Co.

M. D. PAINE
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GLOYD M. WILES
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Utah

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RUSSELL D. LAW, Chairman
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ROBERT S. PALMER
RALPH RUDER

Special Luncheons

A reception abounding in a warmth of friendliness will be given delegates at the welcoming luncheon on Monday noon at the Broadmoor Hotel. With Merrill E. Shoup presiding, greetings will be extended by Mayor George D. Birdsall of Colorado Springs, Governor Ralph L. Carr of Colorado, and United States Senator Edwin C. Johnson of Colorado. Responding for the delegates will be Howard I. Young, president of the American Mining Congress; J. C. Kinnear, national program committee chairman; and Arthur S. Knoizen, chairman of the Manufacturers' Division.

Luncheon at Myron Stratton Home

An added feature of real interest will be a luncheon at the famous Myron Stratton Home on Tuesday noon. David P. Strickler, well-known mining man, will preside and will explain the unique features of this worthy institution, following which he will introduce Dr. R. R. Sayers, Director of the U. S. Bureau of Mines, as guest speaker of the occasion.

A joint luncheon meeting of the Board of Governors of the Western Division and the Board of Directors of the American Mining Congress will be held Thursday noon.

RUSSELL D. LAW
Chairman
Entertainment
Committee

Entertainment for All

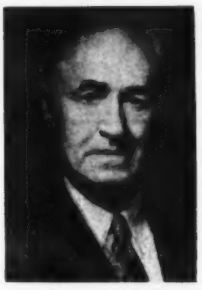
Recreational activities have been carefully arranged to bring all convention - goers together midst attractive surroundings, to renew friendly associations and to relax after the day's business. The Entertainment Committee has outdone itself in providing a stellar bill of amusements. A surprise package of fun is in store for every evening.

An informal "get-acquainted" party Monday evening will lend a rousing opening to the sparkling calendar of entertainment. Held in the setting of the beautiful Broadmoor Gold Club, mining men and their ladies will thrill to the tunes of a crack band and witness a splendid floor show.

Delightful diversion has been planned for Tuesday evening. In the heights of lofty Cheyenne Mountain conventioneers will satisfy their appetites with western steaks broiled in the open, and will exercise their vocal chords in singing those old favorites so readily suggested when good fellowship is the order of the day. An evening of feasting, fun, and frolic long to be remembered.

A real treat is in store for Wednesday night, when graceful artists of the flashing steel blades and the usual "clowns" glide and slide in a dazzling Ice Carnival at the Broadmoor Ice Palace. Following this the delegates themselves, whether novices or experts, will have an opportunity, if so inclined, to cut "figure eights" on the glassy expanse.

W. I. HOWBERT
Chairman
Reception Committee



T. E. NOWELS
Chairman
Publicity Committee

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AMERICAN MINING CONGRESS
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Golden Cycle Corporation

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T. H. O'BRIEN, Inspiration Consolidated Copper Co.
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WORTHEN BRADLEY, Bradley Mining Co.
THOMAS McCORMACK, Natomas Co.
ROBERT LINTON, Los Angeles, Calif.
GEORGE H. RUPP, Colorado Fuel & Iron Corp.
WM. J. COULTER, Climax Molybdenum Co.
ROBERT S. PALMER, Colorado Mining Assn.
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C. A. DYE, Tendoy Copper Queen Syndicate.
J. W. GWINN, Idaho Mining Assn.
W. B. DALY, Anaconda Copper Mining Co.
FRANCIS A. THOMSON, Montana School of Mines.
CARL J. TRAUERMAN, Mining Assn. of Montana.
J. C. KINNEAR, Nevada Consolidated Copper Corp.
H. A. JOHNSON, Tonopah Mining Co.
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IRA L. WRIGHT, Black Hawk Consolidated Mines Co.
T. D. BENJOVSKY, Peerless Mine.
GEORGE W. POTTER, Eagle Picher Mng. & Smelting Co.
L. G. JOHNSON, Federal Mining & Smelting Co.
EVAN JUST, Tri-State Zinc & Lead Ore Producers Assn.
LEVERETT DAVIS, Cornucopia, Oregon.
F. WHALLEY WATSON, Oregon Mining Assn.
GUY N. BJORGE, Homestake Mining Co.
C. E. DAWSON, Bald Mountain Mining Co.
J. D. MacKENZIE, El Paso Smelting Works, American Smelting & Refining Co.
H. E. TREICHLER, Texas Gulf Sulphur Co.
J. O. ELTON, International Smelting & Refining Co.
W. J. O'CONNOR, American Smelting & Refining Co.
A. G. MACKENZIE, Utah Chapter, A.M.C.
LEWIS P. LARSEN, Pend Oreille Mines & Metals Co.
JOHN J. CURZON, Chelan Division, Howe Sound Co.
C. O. DUNLOP, Northwest Mining Assn.

Garden of the Gods, with snow capped Pike's Peak in the background

Program

Seventh Annual Metal Mining Convention

MONDAY, SEPTEMBER 16

MORNING SESSION—SAFETY AND HEALTH

Chairman: GEO. H. RUPP, Mgr., Mng. Dept., Colorado Fuel & Iron Corp.

Sick Absenteeism

ANDREW FLETCHER, Vice Pres. and Treas., St. Joseph Lead Co.

Discussion—Ultra-Violet Ray Solarium

STANLY A. EASTON, Pres., Bunker Hill & Sullivan Mng. & Conc. Co.

Progress in Mine Safety

G. J. BARRETT and D. F. DONOVAN, Oliver Iron Mining Co.

Discussion:

H. A. WALKER, Asst. Gen. Mgr., Homestake Mng. Co.

Propaganda and Practical Experience in Dust Control

EVAN JUST, Sec., Tri-State Zinc & Lead Ore Producers Assn.

Discussion

Appointment of Resolutions Committee

LUNCHEON AND WELCOME TO DELEGATES

Presiding: MERRILL E. SHOUP, Chairman, Western Division, American Mining Congress.

Welcoming Addresses

HON. GEORGE D. BIRDSALL, Mayor of Colorado Springs
HON. RALPH L. CARR, Governor of Colorado
HON. EDWIN C. JOHNSON, U. S. Senator from Colorado

Responses:

HOWARD I. YOUNG, Pres., American Mining Congress
J. C. KINNEAR, Chairman, Program Committee
A. S. KNOIZEN, Chairman, Manufacturers Division, A. M. C.

AFTERNOON SESSION—MINERALS IN THE PRESENT EMERGENCY

Chairman: HOWARD I. YOUNG, Pres., American Zinc, Lead & Smelting Co.

Role of Minerals in the Present War

C. K. LEITH, Mineral Advisor, National Defense Advisory Commission

Strategic Mineral Procurement

ELMER W. PEHRSON, Mining Engineer, U. S. Bureau of Mines

Stimulation of Domestic Production of War Minerals

J. R. VAN FLEET, Vice Pres., U. S. Vanadium Corp.

General Discussion:

ROBERT LINTON, Consulting Engineer, Los Angeles, Calif.
H. C. PARMELEE, Editor, Engineering and Mining Journal

EVENING

Special showing "Arizona—Its Mineral Resources and Scenic Wonders" (sound motion picture), Little Theatre, Broadmoor Hotel.
Informal Dance, Hawaiian Terrace, Broadmoor Golf Club.

TUESDAY, SEPTEMBER 17

MORNING SESSION—GENERAL

Chairman: J. D. MACKENZIE, Mgr., Southwestern Dept., American Smelting & Refining Co.

Industrial Uses of Silver

ALEXANDER GOETZ, California Institute of Technology

Public Mineral Land Withdrawals

RICHARD L. NEUBERGER, Portland, Ore.

Discussion:

ROBERT S. PALMER, Sec., Colorado Mining Association
VICTOR J. HAYEK, Sec., Mining Assn. of the Southwest
H. L. FAULKNER, Counsel, Alaska Miners Association

Public Relations of the Metal Mining Industry

"The Homestake Saga"—A motion picture showing the importance of mining in one of the agricultural states

Discussion:

CARL J. TRAUERMAN, Pres., Mining Assn. of Montana
CHARLES F. WILLIS, Sec., Arizona Small Mine Operators Association

LUNCHEON—Myron Stratton Home

Presiding: DAVID P. STRICKLER, Pres., Stratton Cripple Creek Mining & Development Co.

Speaker: DR. R. R. SAYERS, Dir., U. S. Bureau of Mines.

AFTERNOON SESSION—NEW DEVELOPMENTS IN METAL MINE OPERATION

(Two separate sessions)

"A"—GEOLOGY AND MINING *(Broadmoor Exhibit Bldg.)*

Chairman: JAMES W. WADE, Pres. and Gen. Mgr., Tintic Standard Mining Co.

The Will Rogers Shrine of the Sun on Cheyenne Mountain

Mining Geology Today

IRA B. JORALEMON, Pres., Desert Silver, Inc.

Discussion:

EDWARD THORNTON, Gen. Mgr., Summitville Consolidated Mines, Inc.
GEO. M. FOWLER, Cons. Geol., Joplin, Mo.
FRANCIS A. THOMSON, Pres., Montana School of Mines

New Developments and Equipment in Metal Mining

ROBERT S. LEWIS, Professor of Mining, University of Utah

Discussion:

F. S. MCNICHOLAS, Asst. Gen. Supt., Climax Molybdenum Co. (Scrapers)
ROBERT W. THOMAS, Gen. Mgr., Ray Mines Div., Nevada Cons. Copper Corp. (Conveyors)
J. WILBUR VAN EVERA, Crosby, Minn. (Truck Haulage)
J. J. CURZON, Mgr., Chelan Div., Howe Sound Co.
PAUL SIRKEGIAN, Gen. Supt., Consolidated Coppermines Co. (Diamond Drilling—Conveyors)

"B"—MILLING, PLACER MINING AND GOLD RECOVERY
(Little Theatre, Broadmoor Hotel)

Chairman: ROSS D. LEISK, Gen. Mgr., Sunshine Mining Co.

Progress in Milling Practice and Equipment

BANCROFT GORE, Prof. of Metallurgy, South Dakota State School of Mines

Discussion:

ELMER ISERN, Chf. Met., Eagle Picher Mng. & Smelting Co. (Differential Density Process)
PATRICK BUTLER, Butler Brothers (D. D. Process—Ferro-Silicon)
MAX W. BOWEN, Mill Mgr., Golden Cycle Corporation
T. G. CHAPMAN, Dean, University of Arizona

New Developments in Placer Mining and Recovery of Gold

CHARLES M. ROMANOWITZ and HERBERT A. SAWIN, Yuba Consolidated Gold Fields

Discussion:

E. B. DEGOLIA, Pres.. Gold Hill Dredging Company
W. H. CULLERS, Pres., Sumpter Valley Dredging Co.

EVENING—Mountain Party, Fisher Canyon, Cheyenne Mountain

WEDNESDAY, SEPTEMBER 18

MORNING SESSION—TAXATION

Chairman: HENRY B. FERNALD, Chairman, Executive Tax Committee, A. M. C.

National Defense and National Finance

ELLSWORTH C. ALVORD, Counsel, American Mining Congress

Pending Tax Legislation

(To be announced)

Specific Tax Problems of Metal Mining

ARTHUR L. BALDWIN, Denver, Colo.
DONALD A. CALLAHAN, Wallace, Idaho
A. G. MACKENZIE, Sec., Utah Chapter, A. M. C.
ROBERT M. SEARLS, San Francisco, Calif.

General Discussion

AFTERNOON SESSION—WAGE-HOUR—MINING LOANS CARLTON TUNNEL

Chairman: E. H. SNYDER, Gen. Mgr., Combined Metals Reduction Co.

Administering the Wage-Hour Act

PHILIP B. FLEMING, Administrator, Wage and Hour Division, U. S. Department of Labor

Discussion:

H. L. FAULKNER, Counsel, Alaska Miners Association
EDGAR T. ZOOK, Counsel, Idaho Maryland Mines Co.

Expansion of R. F. C. Loans for Mining

HON. JAMES MURRAY, U. S. Senator from Montana

Discussion

The Carlton Tunnel

A. H. BEBEE, Vice Pres., Golden Cycle Corp.

Discussion

EVENING—Ice Carnival, Broadmoor Ice Palace

THURSDAY, SEPTEMBER 19

MORNING SESSION—LABOR PROBLEMS

Chairman: STANLY A. EASTON, Pres., Bunker Hill & Sullivan Mng. & Conc. Co.

The National Labor Relations Board—An Example of Administrative Agencies

EDMUND M. TOLAND, General Counsel, Special Committee to Investigate the N. L. R. B.

Discussion

Present-Day Industrial Relations

C. S. CHING, Dir. of Industrial & Public Relations, U. S. Rubber Company

Discussion:

D. D. MOFFAT, Vice Pres., Utah Copper Co.
H. M. LAVENDER, Gen. Mgr., Phelps Dodge Corporation

AFTERNOON SESSION—MONETARY POLICIES—WAR'S EFFECT ON METAL MINING

Chairman: (To be announced)

Fiscal and Monetary Policies of the United States

(To be announced)

Review of War's Effect on Supplies, International Movements, Domestic Markets, Prices, Etc.

Copper—D. M. KELLY, Vice Pres., Anaconda Copper Mng. Co.
Lead—E. R. DONDORF and JEAN MCCALLUM, National Lead Company
Zinc—HOWARD I. YOUNG, Pres., American Zinc, Lead & Smelting Co.
Iron Ore—H. L. PIERCE, Vice Pres., Hanna Iron Ore Co.
Mercury—WORTHEN BRADLEY, Pres., Bradley Mining Co.
Tungsten—CHAS. H. SEGERSTROM, Pres., Nevada-Massachusetts Co.

Report of Resolutions Committee

EVENING—Annual Banquet

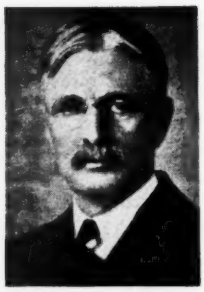
Toastmaster: R. M. HARDY, Pres., Sunshine Mining Co.
Address: HON. KEY PITTMAN, U. S. Senator from Nevada

The Narrows, Williams Canyon

A. E. BENDELARI

DONALD A. CALLAHAN

L. S. CATES



CLINTON H. CRANE

E. B. GREENE

JAS. R. HOBBINS

D. D. MOFFAT

H. L. PIERCE

Metal Directors

AMERICAN
MINING
CONGRESS

Not Shown:
N. W. RICE

CHAS. H. SEGERSTROM

MERRILL E. SHOUP

Palace. Following this the delegates themselves, whether novices or experts, will have an opportunity, if so inclined, to cut "figure eights" on the glassy expanse.

Climaxing the activities of convention week Thursday night will be the annual dinner, to be held at the Broadmoor Hotel. Senator Key Pittman of Nevada, chairman of the important Foreign Relations Committee and a true friend of western mining, will be guest speaker at this memorable event. R. M. Hardy, president of the Sunshine Mining Company, will serve as toastmaster. Special feature entertainment is likewise being arranged by the committee.

Field Trips Scheduled for Closing Days

Educational field excursions have been arranged for Friday and Saturday, September 20 and 21, by the Trips Committee, and these are sure to meet with enthusiastic approval by delegates.

Leading Colorado mining enterprises available for visits include historical Cripple Creek, operations of the Climax Molybdenum Company, the Golden Cycle Mill, the Pueblo operations of the Colorado Fuel and Iron Corporation, Leadville and other nearby mining districts, and the world-famous Carlton deep drainage tunnel.

GEO. H. RUPP
Chairman, Trips Committee

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Since the A. I. M. E. will hold a regional meeting in Salt Lake City the week preceding the convention, metal mining men will be afforded the opportunity of attending both gatherings with a minimum of time away from headquarters. Those attending the technical sessions at Salt Lake City are especially invited to continue on to Colorado Springs for consideration of the industry's vital economic, legislative and operating problems.

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The visit to the Carlton Tunnel should be of unusual interest to active operating men. At the end of the first year of actual driving in the new drainage tunnel, drilling crews working 357 days out of the 366 had driven 17,584 ft., with a daily average of 49.3 ft. Mining records were broken for the greatest distance ever driven in 24 hours, with 74 ft. being cut through.

Ladies Assured Enjoyable Stay

A special program of entertainment is being worked up for the ever-increasing number of ladies accompanying their husbands to these meetings. Colorado Springs, with its many beauty spots, teems with attractions that strike the feminine fancy and the ladies will not lack for activities during the daytime. Details will be announced at the meeting.

Combine business with pleasure by including the western vacation lands in the convention visit itinerary. Colorado abounds in scenic wonders. Short trips out of Colorado Springs will take you to breath-taking Pikes Peak, the Garden of the Gods, Cave of the Winds, Rainbow Falls, and innumerable other garden spots. Join the throng along the Gold Rush Trail.

"See You in Colorado Springs"

Exposition to Feature New and Time-Tested Equipment

P. D. McMURRER
Assistant Secretary, American Mining Congress

AN IMPRESSIVE display of modern metal mine machinery and supplies, assembled in the spacious exhibit hall at the Broadmoor, will be participated in by over 70 prominent national and local manufacturers. Exceeding in size and interest all preceding shows, the Exposition affords the convention visitor the unique opportunity of viewing at a central location the latest innovations in all types of equipment necessary to modern mining and milling operations.

Cost-reducing ideas—efficiency-improving equipment—await the wide-awake operating man at this great machinery and supply mart. The manufacturers are leaving no stone unturned to present the industry with the most up-to-date displays. Supervising their exhibits will be special representatives with a broad knowledge of operating conditions, who will lend their trained assistance to the mining men in solving equipment problems.

Space precludes a lengthy description of the displays to be seen at the Metal Mining Show, but the following "prevues" outline some of the items that will be in the limelight.

• ALLEN-SHERMAN-HOFF COMPANY, THE

Will exhibit a C-frame Hydroseal slurry pump used by metal mines for handling solutions containing finely divided materials, a complete set of rubber parts for an A-frame Hydroseal pump, and one of the company's new AA-frame Hydroseal pumps.

A companion to the Hydroseal pump known as the Packless pump, for corrosive or corrosive and abrasive solutions, will also be on display. In addition, the company will also show one of their Flex-Check valves, additional rubber parts for this valve, and will have available pictures and literature showing their sand pumps and dredge pumps.

• AMERICAN BRATTICE CLOTH CORPORATION

Company's new demountable split coupling, which reduces air leakage at the joints to a minimum and permits rapid installation; a short line of mine vent tubing, showing the different grades manufactured, and different types of suspension—all connected to a 12-in. diameter blower fan. *In charge—Blaine Mikesell.*

• AMERICAN STEEL & WIRE COMPANY

See U. S. Steel Corporation Subsidiaries.

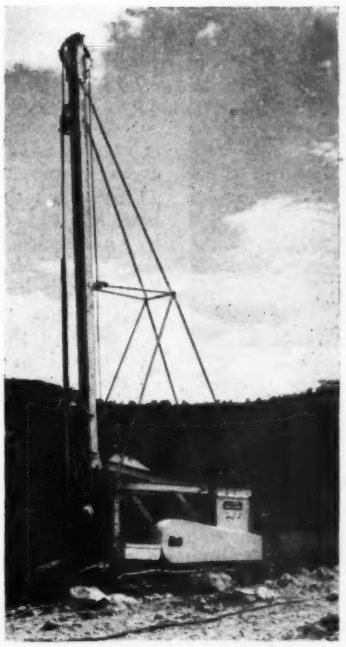
• ANACONDA WIRE & CABLE COMPANY

Built around the theme of adequacy, safety, and economy in mine wiring, the company will display samples of portable mining machine cable, mine trolley wire, telephone wire, shot-fire cord, and arc welding cord. Will also display enlarged model of Anaconda's three-conductor Sunex Securityflex portable cable for mine use, and Anaconda borehole suspension unit. *In charge—E. A. Casey.*

• ATLAS POWDER COMPANY

Will feature Atlas amodyns, a new series of ammonium nitrate explosives for mining. Amodyns show increased spreading action and reduced secondary blasting.

Atlas amodyns are available in two series—high velocity and low velocity. All amodyns have the same weight strength, but different cartridge counts make available explosives of different cartridge strengths.



• BUCYRUS-ERIE COMPANY

Will display and demonstrate a one-quarter size model of its 29-T blast hole drill. This model is a faithful reproduction of the full size machine and can be used to demonstrate such interesting features as the rubber shock absorber, power-driven tool wrench, its all-steel construction, rubber-insulated sheaves, etc. The booth will also display a collection of photographs of quarry and mining shovels used throughout the world. *In charge—M. J. Woodhull.*

• C. S. CARD IRON WORKS COMPANY, THE

Will exhibit moving cutouts and replicas of some 50-odd different types and sizes of ore cars which the company has furnished the mining industry. Also will display "Card" semi-steel heat-treated wheels to show both design and structural features. *In charge—W. H. Bachman.*

• CARNEGIE-ILLINOIS STEEL CORPORATION

See U. S. Steel Corporation Subsidiaries.

• CATERPILLAR TRACTOR COMPANY

No description received.

• **CLEVELAND ROCK DRILL COMPANY, THE**

Will show a complete line of rock drills for the mines, including sinkers, drifters, stopers, and accessories. The exhibit will feature the following new machines: Model PD24 drifter with automatic feed, Model SS22 stoper, and Model H23 sinker. The design of the new series of sinkers, drifters, and stopers is notable since the special feature is the interchange from one type to another of many important parts. Another fast-drilling machine to be on view is the new 60-lb. Model H111.

Will also display a line of pneumatic tools especially suited to construction and repair work around the mine and mill. Included will be riveters, chippers, scaling tools, drills, grinders, rotary sump pumps, valves, couplings, and miscellaneous related accessories. *In charge—E. L. Oldham.*

• **COFFING HOIST COMPANY**

Will show a new Quik-Lift electric hoist attached to a trolley. This hoist is built in sizes from 250 lbs. to 4,000 lbs., single speed control, having various speeds for various capacities. Also will feature a well-known utility rachet lever hoist, the company's Safety-pull, built in capacities from ¾-ton to 15 tons, and the new Model C high efficiency spur gear hoist, built in capacities from ½-ton to 3 tons. All this equipment is new and contains special safety features. *In charge—W. S. Morrow.*

• **COLORADO FUEL & IRON CORPORATION, THE**

No description received.

• **CRANE COMPANY**

Will present an attractive, well-chosen exhibit of the various types of valves and fittings applicable to the mining industry. Prominent in this display will be brass, iron and steel valves for such services as steam, water, air, gas, and oil. Screwed, flanged, socket, and butt welding fittings as well as solder joint products will also be featured. *In charge—F. E. Davenport.*

• **CRUCIBLE STEEL COMPANY OF AMERICA**

No description received.

• **DENVER EQUIPMENT COMPANY**

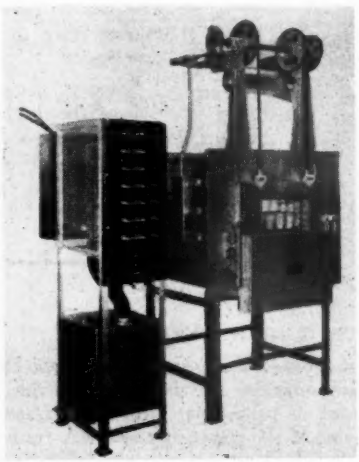
An operating model of the Denver hydro-classifier will be on exhibit. Mounted on the beams of this unit will be the new ½-in. Denver diaphragm pump recently developed for laboratory work. The hydro-classifier, even though a model, is used in the laboratory and is a complete duplicate of a commercial unit, including the enclosed reducer lifting device.

A special Denver unit flotation cell with a glass front will be on display to show what takes place inside of the machine while in operation. A set of the new molded rubber parts, including receded disc compellor and diffuser will be used in this machine.

The recently designed 4 x 6-in. Denver mineral jig, used particularly for cleanup work, will also be exhibited.

The Denver laboratory rod mill of the tilting type will be in operation, demonstrating the use of this machine for grinding practice in the laboratory. *In charge—J. N. Cronk.*

• **DENVER FIRE CLAY COMPANY**



Will show the company's new electric assay furnace. Constant control of temperatures and positive control of atmospheric conditions for cupeling are features of this new furnace. *In charge—I. G. Gates.*

• **DIFFERENTIAL STEEL CAR COMPANY**

Exhibit will consist of a photographic display made up of large photographs of air dump cars for open pit mining, underground mine cars, mine locomotives, and tailings disposal equipment. Complete haulage systems will also be featured. *In charge—H. F. Flowers.*

• **DORR COMPANY, INC., THE**

The exhibit will consist of a number of scale working models of Dorr equipment, photographs and drawings of installations and a large, illuminated display piece illustrating, in flowsheet form, a typical Dorr installation at a combination flotation and cyanide gold mill.

Three types of classifiers will be on display—the heavy duty Dorr FX, the Dorr Hiflow classifier for coarse separations in the 4 to 35 mesh range, and the Dorr bowl classifier for extremely fine separations ranging down to 325 mesh.

Two types of thickeners will be on display—the Dorr balanced tray thickener, a multiple compartment unit giving maximum capacity per unit of floor area; and a Dorr Torq Thickener, a single compartment unit, with automatic raking arms which raise automatically in case of an overload.

Also to be shown are a model of the Dorrco V-type pump, for removing sludge from sedimentation tanks, and a model of the Type A Agitator, extensively used for agitating cyanide slimes. *In charge—Alex D. Marriott.*

• **DU PONT DE NEMOURS & COMPANY, INC., E. I.**

Will emphasize the company's Gelex type of explosives for ore mining. Will also exhibit electric blasting caps and other accessories necessary for the detonation of explosives. A section of the exhibit will be devoted to Ventube, with illustrations of some of the principal installations of

this ventilating tubing. Samples of Ventube will be available for inspection. *In charge—J. T. Turnbull.*

• EDISON, INC., THOMAS A.

Will feature Edison nickel-iron-alkaline storage batteries for use as a source of motive power in metal mine haulage. The unique all-steel construction of the Edison cell will be shown in several types of cutaway cells. The Edison storage battery was Thomas A. Edison's most difficult invention, one that required more than 50,000 experiments over a period of 10 years before being perfected. Since 1908 it has been a widely used source of power famous for long, dependable service wherever battery-motivated units are used. The Edison electric cap lamp, which is energized by a small Edison storage battery, will also be shown. *In charge—R. H. Weeks, Jr.*

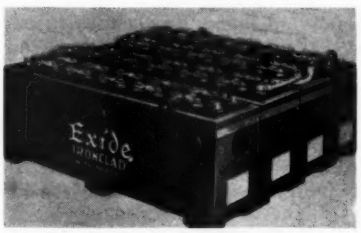
• EIMCO CORPORATION, THE

Principal feature of the exhibit will be a moving picture showing the Model 21 Eimco-Finlay loader in operation at the Carlton Tunnel, and also at the 24,000-ft. Elton Tunnel which is being driven near Tooele, Utah, by the National Tunnel and Mines Company to drain a group of mines under conditions somewhat similar to those existing at Cripple Creek, where the Carlton Tunnel is being driven for a similar purpose.

Will also show a Model 21 Eimco-Finlay loader similar to those now in use at the Carlton and Elton Tunnels. *In charge—P. M. Sheriger.*

• ELECTRIC STORAGE BATTERY COMPANY, THE

Various types of Exide-Ironclad batteries used for mine locomotive service, represented by cutaway cells, will be on exhibit. Those on display will be the Types MVM and TLM. These cutaway cells show the slotted rubber tube construction of the positive plate used in the Exide-Ironclad battery — a feature unique with this battery. *In charge —J. N. Rosholt.*



• ENGINEERING AND MINING JOURNAL

Exhibit will be dedicated to announcing the publication's 75 years of continuous service to the mining industry following its founding in 1866 as *The American Journal of Mining.*

The exhibit will be a replica of a "Gay Nineties" western miner's cabin and preliminary details of *Engineering and Mining Journal's* "Diamond Jubilee" edition to be published in August next year. *In charge—H. W. Clarke.*

• GARDNER-DENVER COMPANY

A mine carloader will be the central feature of the exhibit. This will be a Model GD-9 powered with two 5-cylinder radial air motors. This is the basic model of a series of three. The other two, GD9-H and the GD9-L, are designed for mine cars which are higher or longer than average.

Hand-cranked and automatic-feed drifting drills will be displayed, including the new lightweight D-73 drifter of 2¾-in. bore. The Gardner-Denver automatic feed drifters are featured by their built-in motor, which is a part of the drill rather than a part of the shell.

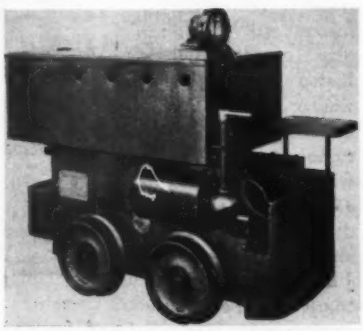
Two sizes of air hoists will be shown, both powered with 5-cylinder radial motors. Complete sealing of all working parts against the entrance of dirt or water is one of the outstanding features of these hoists. Models R-104 and R-91 self-rotating stopers and the H-81 hand-rotated stoper will be shown as well.

A line of sinkers from the 31-lb. Model S-33 to the 67-lb. S-73 will also be shown. The S-73 is a recent addition in the field of shaft-sinking drills.

The rock drill plant of Gardner-Denver Company is located in nearby Denver and all who attend the Mining Congress are cordially invited to see this precision manufacturing plant. Arrangements for this may be made at the Gardner-Denver booth. *In charge—R. H. Pearson.*

• GENERAL ELECTRIC COMPANY

An improved 1½-ton G-E storage-battery trammer locomotive will be the feature attraction of the company's exhibit. This trammer locomotive is built to meet the needs of metal mines which require locomotives to do haulage duty on more than one level. Its compact construction keeps it within the dimensions of standard cages and allows it to pass easily through spots where clearances are limited. Its service capacity has been increased by means of extra interchangeable battery boxes.



Without bumpers, the improved locomotive measures only 46 in. in length and 33 in. in width. It has a totally enclosed motor, makes use of anti-friction bearings and a controller which utilizes series and parallel field connections and provides four speeds forward and reverse.

In addition to the trammer locomotive, the exhibit will include a cable display board containing samples of Formex magnet wire, tellurium, Versatol, Flamenol, and other cables. There will also be a sample core and coils from a small Spirakore transformer.

A typical set of sample motor parts and some sample sealed Ignitrol mercury arc rectifier tubes will be on display. These tubes will be cutaway samples, showing internal construction. They will have nominal average current ratings of 200 and 100 amperes, respectively. Several "House of Magic" devices will complete the exhibit. *In charge—F. M. Orsborn.*

• GIBRALTER EQUIPMENT & MANUFACTURING COMPANY

No description received.

• GOODMAN MANUFACTURING COMPANY

Will display one of their G-20 shaker conveyor drives with motor mounted and with connecting or drive trough installed. At present there are installations of this type of equipment in copper, hematite, potash, borax, and salt.

The Mancha Storage Battery Locomotive Division of the Goodman Manufacturing Company will exhibit Mancha's little trammer, widely used mining locomotive.

The shaker drive and trammer will both be operative exhibits. *In charge—J. D. James.*

• HENDRIE & BOLTHOFF MANUFACTURING & SUPPLY CO.

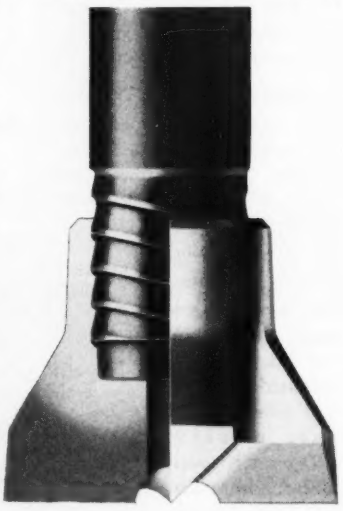
No description received.

• HERCULES POWDER CO., INC.

Exhibit will consist of a huge, flashing telegraph key sounding off the advantages of Hercules Gelamite explosives for metal mining. *In charge—Theodore Marvin.*

• INGERSOLL-RAND COMPANY

Will exhibit a number of the company's newest rotating stopers—R-48 and R-58 "Stopehamers." Other items on display or illustrated will include Cameron pumps, air and electric driven slushing hoists, blowers, compressors, etc. Because of the wide attention given the Carlton Tunnel project, of special interest will be a display of Ingersoll-Rand equipment similar to that used in driving this famous tunnel. This will include the DA-35 power-feed drifter and detachable bit equipment—Jackbits and a complete line of tools developed by Ingersoll-Rand for conditioning and reconditioning these bits. *In charge—L. H. Geyer.*



• INTERNATIONAL NICKEL COMPANY, INC., THE

Exhibit will consist of an appropriate decorative background and some typical applications of alloys of nickel widely used in the mining field. These will include: Wrought nickel alloy steels used where equipment is subjected to heavy stresses, shocks, overloads and other conditions requiring a high degree of strength; nickel steel castings; nickel cast iron; Ni-Hard—a chilled or sand-cast alloy iron containing approximately 4.50 percent nickel and 1.50 percent chromium, principally used in mining equipment for castings subjected to abrasive conditions such as ball mill liners, grinding balls, crushing machinery, sand pumps, conveyor parts, etc.; and non-ferrous alloys such as Monel, malleable nickel, Inconel and the nickel bronzes. *In charge—J. E. Kerr.*

• JEFFREY MANUFACTURING COMPANY, THE

Will display a heavy-duty vibrating grizzly feeder used for by-passing fines ahead of primary and secondary crushers. These units are supplied for handling ore from 3-ft. cubes down to dust in both wet and dry operations and in capacities of 500 tons down to 25 tons.

Also, a Jeffrey-Traylor electric Conveyanscreen will be in operation and will be equipped with Heller piano wire cloth, which is being used successfully for handling mucky ore ahead of secondary crushers and rolls. These vibrating screens are supplied in single and double decks in sizes of 2 to 40 sq. ft.

• JOYCE-CRIDLAND COMPANY

No description received.

• KANSAS CITY STRUCTURAL STEEL CO.

Will display enlarged photos showing some of their outstanding activities, among them being a very interesting perspective of the Morenci Reduction Works for Phelps Dodge Corporation's construction program at Morenci, Ariz.—an unusual enlargement of one of the largest head frames and also a very interesting aerial view of Kansas City, Mo., showing the steel frame buildings constructed by this company. *In charge—Norman W. Funk.*

• LESCHEN & SONS ROPE COMPANY, A.

Exhibit will consist of a complete assortment of samples of wire ropes as are used today in the metal mining industry. These samples will include the well-known "Hercules" (red-strand) wire rope in the flattened strand, round strand and non-rotating constructions, in both preformed and standard types. *In charge—C. E. Pester.*

• LINK-BELT COMPANY

Included in the company's displays will be: An operating exhibit of Link-Belt herringbone gear reducer in a transparent case to show the internal mechanism; a comprehensive line of the latest design of belt conveyor idlers for every type of service; an attractive back wall panel of photographic enlargements of typical Link-Belt materials handling and power transmission installations in the metal mining industry.

Also to be shown are samples of various types of Link-Belt Shafer anti-friction roller bearings, both mounted and unmounted units; babbitted type bearings, take-ups and other power transmission products; chains for conveyors and drives; samples of Silverstreak silent chain and Silverlink roller chain, including the "RC" flexible couplings. *In charge—S. C. Shubart.*

• MANCHA STORAGE BATTERY COMPANY

See Goodman Manufacturing Company.

• **MARION STEAM SHOVEL COMPANY, THE**

Large photographic display showing the company's type 4161—5 cubic yard shovels in operation at the clay open pit mine of the Phelps Dodge Corporation, Morenci, Ariz. *In charge—L. C. Mosley.*

• **MINE SAFETY APPLIANCES COMPANY**

Will display a complete line of personal protective equipment and instruments for safety in metal mining, including: the Model P electric cap lamp; self-contained oxygen breathing apparatus for rescue work; carbon monoxide detectors and indicators; new explosives carrier; trolley guard hanger; skullgard protective hats and caps; H-H inhalator with auxiliary attachment; safety shoes and pacs; Comfo and Dustfoe respirators; Midget Impinger for dust sampling; all-service gas masks equipped with all-vision facepieces; M.S.A. self-rescuers; first aid kits and supplies; and Foille, the new widely accepted burn treatment. *In charge—J. C. Jackson.*

• **MINE & SMELTER SUPPLY COMPANY**

No description received.

• **MINING CONGRESS JOURNAL**

Will distribute free copies of September Metal Mining Convention and Exposition number, featuring numerous fine articles of particular interest to metal mining men, and a complete write-up of scheduled events for the convention, together with a preview of exhibits to be displayed at the Exposition.

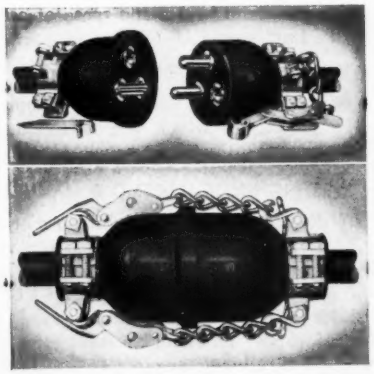
• **MORSE BROS. MACHINERY COMPANY**

Display will include a commercial size "Vari-Stroke" ore feeder and a small 3-ft. diameter by 1-ft. wide continuous drum type vacuum filter. The laboratory size of the company's "Trueline" rake type classifier, Morse-"Weinig" 500 gram and 2,000 gram laboratory flotation machines, laboratory batch ball mill and batch laboratory batch will also be shown.

Enlarged photographs of actual installations and commercial sizes of ore dressing machinery will also be on display.

• **OHIO BRASS COMPANY**

Will feature the company's line of overhead trolley and feeder materials, rail bonds and locomotive equipment, protective devices, and their new multiple cable plug for connecting three-circuit insulated trailing cables. The plug consists of a split rubber body with three phosphor bronze plugs or plug receptacles in each half. The plugs are clearly marked and are arranged so that connections cannot be made improperly. Plug bodies can be attached to cables in the field without makeshift, tape-wound splices or special tools. Two steel chains lock the halves of the plug together so that they cannot be pulled apart inadvertently in service. *In charge—J. H. Sanford.*



• **OWENS-CORNING FIBERGLAS CORPORATION**

No description received.

• **PORTABLE LAMP & EQUIPMENT COMPANY**

No description received.

• **ROEBLING'S SONS COMPANY, JOHN A.**

Will feature samples of wire rope, insulated wire, and woven wire fabrics, together with advertising literature covering the company's products. *In charge—F. J. Maple.*

• **SAUERMAN BROS.**

Will feature a small working model consisting of a Sauerman power drag scraper, handling bulk materials to and from an open storage pile. The scraper model will be complete with electric driven double-drum hoist, headpost with fair-lead sheaves, rapid-shifting tail bridle, Crescent scraper bucket, etc.

On a stage at the back of the exhibit will be a display of illuminated pictures of typical material-handling operations showing, among other items, a slackline cableway conveying gravel from a wet pit to a washing plant, a power drag scraper feeding material to a crusher, a tower excavator moving along the top of a wide open pit and loading blasted ore from the pit into cars.

Various sizes of "Durolite" all-steel blocks with roller bearings and with bronze bearings will also be on display. *In charge—D. D. Guilfoil.*

• **SHEFFIELD STEEL CORPORATION**

No description received.

• **S. K. F. INDUSTRIES, INC.**

Will exhibit a complete line of ball and roller bearings. *In charge—H. A. Westwater and R. C. Byler.*

• **SOCONY-VACUUM OIL COMPANY, INC.**

Will feature a sound motion picture dealing with "The Inside Story"—a story of lubrication. Also on display will be photographic color enlargements illustrating various industrial uses of Gargoyle Lubricants. Transparent plastic models of a bearing, a cylinder, and gears, symbolizing the featured players of the motion picture, will be shown and will be touched with red to indicate an oil film at the points where correct lubrication is a vital necessity.

• **SULLIVAN MACHINERY COMPANY**

Will feature a new development in the line of high-speed drilling for metal mines. This unit will actually be drilling under glass and will simulate mining conditions.

Also on display will be the improved Sullivan HL-2 mine car loader equipped with new control equipment featuring Sullivan independent centering device and curved track for bucket travel, which allows loading of higher mine cars.

Other equipment on display will be a new 3½-in. drifter,

the improved Sullivan self-supported safe-T-stoper, the new S-91 hand-held stoper and the new L-57 hand-held hammer drill. *In charge—R. E. Campbell.*

• TAMPING BAG COMPANY, THE

Will exhibit their new machine for filling tamping bags, known as the "Dummy Maker." The "Dummy Maker" utilizes the advantages of the vibrating conveyor, both for conveying the stemming material and for compressing the bags to any desired degree of hardness. By incorporating the handling of the material and the packing of the bags into one unit, it is possible to fill and compress from 400 to 600 dummies an hour—with two operators. Powered with a 1/3 h.p. motor and having its speed adjusted through rheostats, it is possible to regulate the flow of material to suit the conditions—that is, from 25 pounds minimum to the maximum capacity of 100 pounds per minute. Ease of operation and simplicity of design are features of the machine that give it a low operating cost with a minimum of repairs. *In charge—Alfred E. Pickard.*

• TEMPLETON, KENLY & COMPANY

Will exhibit their complete line of Simplex mine jacks for coal cutting and loading machines, re-railing mine cars and locomotives, cross timbering, car straightening, track work, post pulling, stretching heavy cable and trolley wire, tensioning chain hauls and conveyor belts, roof jacks and jacks for other special mining purposes.

The new Nos. M8 and M16 mine roof jacks will be displayed. They are rated at 8 and 16 tons, respectively, and are 50 percent stronger than their predecessors, the M7 and M15. The new No. 366 timber jack, which tightens against the roof and bottom for safely lifting wood or steel beams, will be demonstrated. *In charge—P. H. McManus.*

• TIMKEN ROLLER BEARING COMPANY, THE

Will feature a complete display of Timken rock bits and will also include a display of Timken bearings as used in mine cars, locomotives and other mining equipment. Included in the rock bit display will be samples of all sizes of Timken rock bits displayed with rather a unique device, enlisting the aid of mirrors. A giant replica of a Timken bit several feet high will be included in the exhibit. *In charge—Peter J. Poss.*

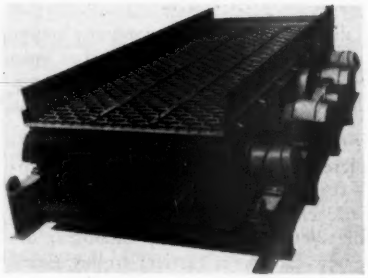
• TRAYLOR ENGINEERING & MANUFACTURING COMPANY

Large photographic display of the company's TY reduction crusher, multi-stage reduction crusher and Type H Blake jaw crusher, and including two diagrams demonstrating the advantages of curved jaw plates and the company's bell heads and curved concaves. *In charge—S. W. Traylor, Sr.*

• TYLER COMPANY, THE W. S.

Will display a 5-ft x 10-ft. Ty-Rock screen, Type F600, which is especially suitable for screening coarse, heavy ores, crushed rock, etc.

Also on exhibit will be samples of Tyler high-capacity



woven wire screen, including Ton-Cap oblong opening screen; Ty-Rod, the long slot screen for slow-screening material, and Tyler flat-top screen, a new type of wire cloth offering even distribution of abrasion and increased life. *In charge—E. M. Graham.*

• UNION WIRE ROPE CORPORATION

Will have three types of exhibits showing wire rope constructions. These exhibits will be augmented by educational pamphlets on the proper choice of various rope constructions and on the care, handling, socketing and splicing of wire ropes. *In charge—Evans Powell.*

• U. S. BUREAU OF MINES

No description received.

• UNITED STATES STEEL CORPORATION SUBSIDIARIES

Cooperating in this joint exhibit will be American Bridge Company, American Steel and Wire Company, Columbia Steel Company and Carnegie-Illinois Steel Corporation. Included will be a representative display of American Steel and Wire Company products such as wire rope and cables, including a sample of 6-in. bridge cable and a section of bore-hole cable with fittings, electrical wire and trolley wires and rail bonds.

Carnegie-Illinois Steel Corporation are preparing a special display section to include their Lorain replaceable mill liners and reversible lifting bars. They will also show steel mine timbering sections, sections of mine track, rails and ties, together with a special display featuring their new metal mine tie with a ballast stop.

Cor-Ten, developed by Carnegie-Illinois, will be represented by a special corrosion test exhibit. With this test will be a series of photographs illustrating the wide application of this steel to mine and associated equipment.

American Bridge Company products will be shown in a special series of photographs. *In charge—M. L. Neison.*

• VICTAULIC COMPANY OF AMERICA

Will feature the latest advancements in Victaulic couplings and Full-Flow fittings. Several motor driven models operating under pressure and suction assimilating the various conditions of mine piping will demonstrate leak-tightness, flexibility, automatic provision for contraction and expansion and ease and speed of assembly. *In charge—R. W. English and M. C. Hutchinson.*

• WESTERN CARTRIDGE COMPANY

Will display the company's complete line of blasting caps, samples of which will be mounted on a modernistic and colorful background panel. *In charge—E. B. Smoot.*

• WESTINGHOUSE ELECTRIC & MANUFACTURING CO.

Will feature a 500-kw ignitron rectifier unit. A photographic display of other ignitron units now in use at mining properties and a diagramatic illuminated chart showing the operation of ignitron tubes will be included. Also on exhibit will be an operating model with Westinghouse "splash proof" motor in constant spray of water. *In charge—P. H. Grunnagle and T. M. Googin.*

The cooling coils on the 3,600 level. Size 9 ft. 8 in. x 9 ft. 8 in. Chilled water lines show in upper left. Condensate from coils may be seen in ditch at lower right

UNDERGROUND COOLING at the MAGMA MINE

● ***Results After 3 Years of Operation Highly Satisfactory, Warranting Extension to Deeper Levels***

By C. B. FORAKER
Magma Copper Company

IN 1937 the Magma Copper Company installed an underground refrigeration plant for the purpose of cooling the air for the 3,600 and 3,400 levels of the Magma Mine at Superior, Ariz. This plant consists of two units of 140 tons refrigeration capacity each, one unit cooling the air for the 3,400 level and the other the 3,600 level. Each unit is designed to cool 30,000 cubic feet of air per minute 10° on the wet bulb temperature. When these units were started, stoping operations commenced immediately and have continued to the present time.

Unusually high rock temperatures have made air-cooling necessary. The following are the rock temperatures of the lower levels:

3,200 level	127°
3,400 level	130°
3,600 level	134°
3,800 level	137°
4,000 level	140°
4,200 level	143°
4,400 level	146°
4,600 level	150°

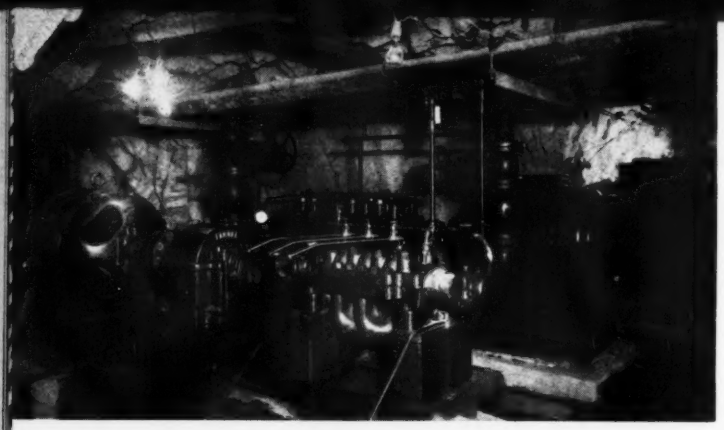
Details of the refrigeration plant were discussed in the November, 1937, issue of *Mining Congress Journal*, so it is thought best to give the results obtained from the installation rather than a description of the plant itself.

Drop in Temperatures at Working Places

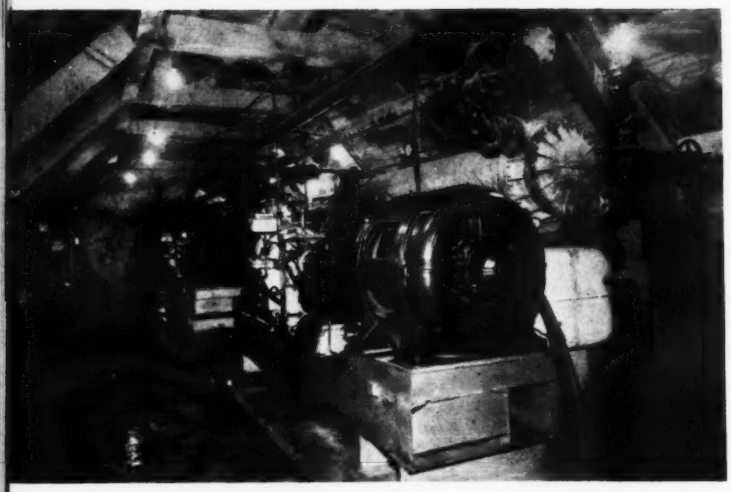
Prior to the installation, the temperatures of the working places on the 3,400 level averaged 90° wet bulb temperature, 103° dry bulb temperature, and 58 percent relative humidity. After four months of air-conditioned ventilation the average of all working places was 72° wet bulb, 80° dry bulb, and 68 percent relative humidity. The maximum benefit was derived from the cooling system after seven months of operation (February, 1938), when, aided by the cooler incoming air, due to surface temperatures, the average of all working places was 71° wet bulb, 81° dry bulb, and 62 percent relative humidity. The number of active stopes on the 3,400 and 3,600 levels has been increased until, at the present time, approximately 50 percent of the mine production is coming from these levels. The temperatures of all active stopes averaged 74° wet bulb and 81° dry bulb.

The corresponding temperatures for the 3,600 level are as follows:

Before air-cooling: wet bulb 93°, dry bulb 101.5°, and relative humidity 74 percent.



Condenser water pumps for No. 1 and No. 2 refrigeration units on the 3,600 level



3,600 refrigeration station showing No. 1 and No. 2 units. The cooling coils for the 3,600 level may be seen in the extreme background

After four months of air-cooling: Wet bulb 78.5°, dry bulb 88.5°, and relative humidity 64 percent.

After this time, the temperatures of the 3,600 level did not improve due to the fact that return air from development below the 3,600 level passed through the 3,600 cooling coils. However, when it was possible to send the return air from the 4,000 level to the main exhaust shaft, the average of all working places on the 3,600 level was as follows: 74° wet bulb and 79° dry bulb.

Underground Water Supplies Condensers

The refrigeration units use the entire underground water supply for condenser water. The outgoing condenser water varies from 112° to 118°, and when the units were started this water was pumped up No. 3 shaft and out of the mine through a 1,200-ft. adit using an open ditch. This adit and the shaft are fresh air intakes and the water gave up some of its heat to the ingoing air, thus nullifying a part of the benefit derived from refrigeration.

In June of 1938, a new pumping plant was completed and placed in operation on the 3,600 level near No. 8 shaft. The two pumps are horizontal, duplex Prescott-Menominee pumps, capable of pumping 600 g.p.m. against a head of 3,304 ft. The hot condenser water from the refrigeration plant is now pumped out of the mine in one lift through No. 8 shaft, which is an exhaust ventilation shaft. The pump installation was described in the October, 1939, *Engineering and Mining Journal* by E. E. Slack, of the Magma Copper Company.

Extension to 4,000 Level

By the middle of 1939, the 4,000 level was far enough along with its development so that it was desired to install an air-conditioning plant for this level to permit starting stoping. To do this, it was necessary to devise a method of getting condenser water for a third unit, as all the water available was being used in the first two units. It was decided to install an underground cooling pond on the 3,600 level between the pump station and No. 8 shaft; 45,000 c.f.m. of air leaves the level via No. 8 shaft. The temperature of this air is usually 88° wet bulb and 98° dry bulb throughout most of the year, and 90° wet bulb and 100° dry bulb during the warmest summer months. By three-stage spraying it is possible to cool 200 g.p.m. of the hot condenser water back down to within 2° of the wet bulb temperature of the air. By cooling and recirculating this 200 g.p.m. of condenser water, an adequate amount of water is available for a third unit.

The third unit was installed and put into operation on the 4,000 level in November, 1939. It is similar to the first two units in capacity and operation, but the efficiency has been considerably increased by improvement of design in the condenser tubes. It is a Carrier centrifugal compressor, powered by a 150-hp. motor, using Carrene No. 2 (mono fluro trichloro methane) for a refrigerant. It chills 200 g.p.m. of water to 60° and this water is circulated in closed circuit from the plant to the cooling coils and return. Thirty thousand c.f.m. of air is drawn through the cooling coils by an American H. S. No. 8 blower, and it is cooled 10° on the wet bulb temperature.

Temperatures of all working places on the 4,000 level averaged 93° wet bulb and 99° dry bulb before air-conditioning. After two weeks of air-cooling, the same places averaged 85° wet bulb and 91° dry bulb. These temperatures have not improved due to the fact that return air from the development of the 4,200 and 4,400 levels passes through the cooling coils on the 4,000 level.

In May, 1940, the cooling coils from the 3,400 level were moved to the 3,800 level. The working places were immediately lowered in temperature from 84° wet bulb and 96° dry bulb to 77° wet bulb and 89° dry bulb.

Plan to Move Cooling Coils Well Below Refrigeration Units

It is intended to move the upper cooling coils down to the lower levels, as mining at deeper levels progresses, still leaving the refrigeration units in their present locations. It is thought that the cooling coils may be located as much as 1,000 feet below the units.

After three years of operation, the Magma Copper Company is very well satisfied with underground air-cooling by mechanical refrigeration, and it is believed that it has been possible to work in places that otherwise could not be worked, or at least where the work would have been materially slowed up.

DEPENDABLE VENTILATION *with* JEFFREY FANS

INSURES

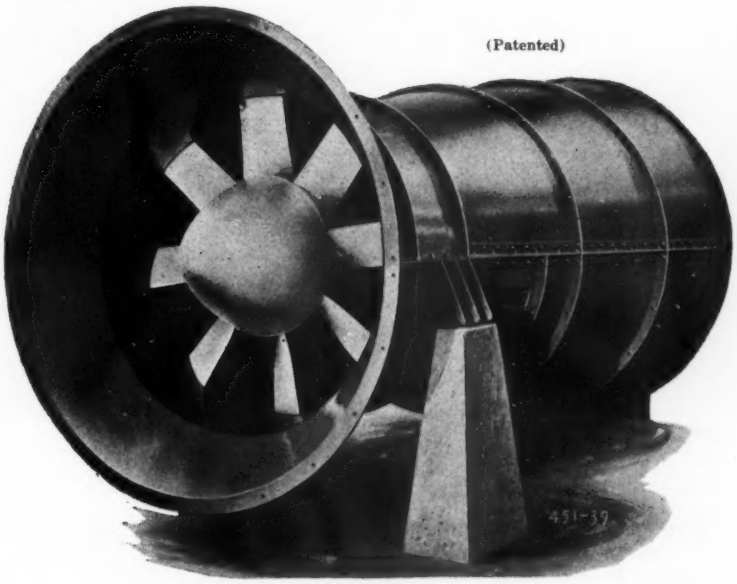
- MAXIMUM EFFICIENCY
- CORRECT DESIGN
- SAFE WORKING CONDITIONS
- INCREASED EMPLOYEE COMFORT
- ACCELERATED PRODUCTION
- GREATER PROFIT

THE JEFFREY-TYPE 8-H AERODYNE
(right)

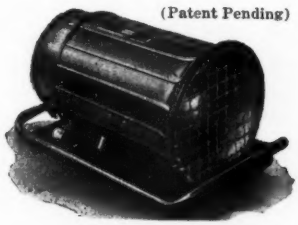
will maintain static efficiencies well over 80% over a wide range of duties. Features are (a) High capacity (small size) (b) Low speed (quiet operation) (c) Adjustable Blades (flexibility of application) (d) Pressures up to ten inches.

Send for Bulletin No. 719.

(Patented)



(Patent Pending)



THE JEFFREY AERODYNE MIDGET
(left)

Streamlined propeller type tubing blower--weighs only 125 lbs., is but 17 inches high overall. Flame proof construction with high capacity and great accessibility.

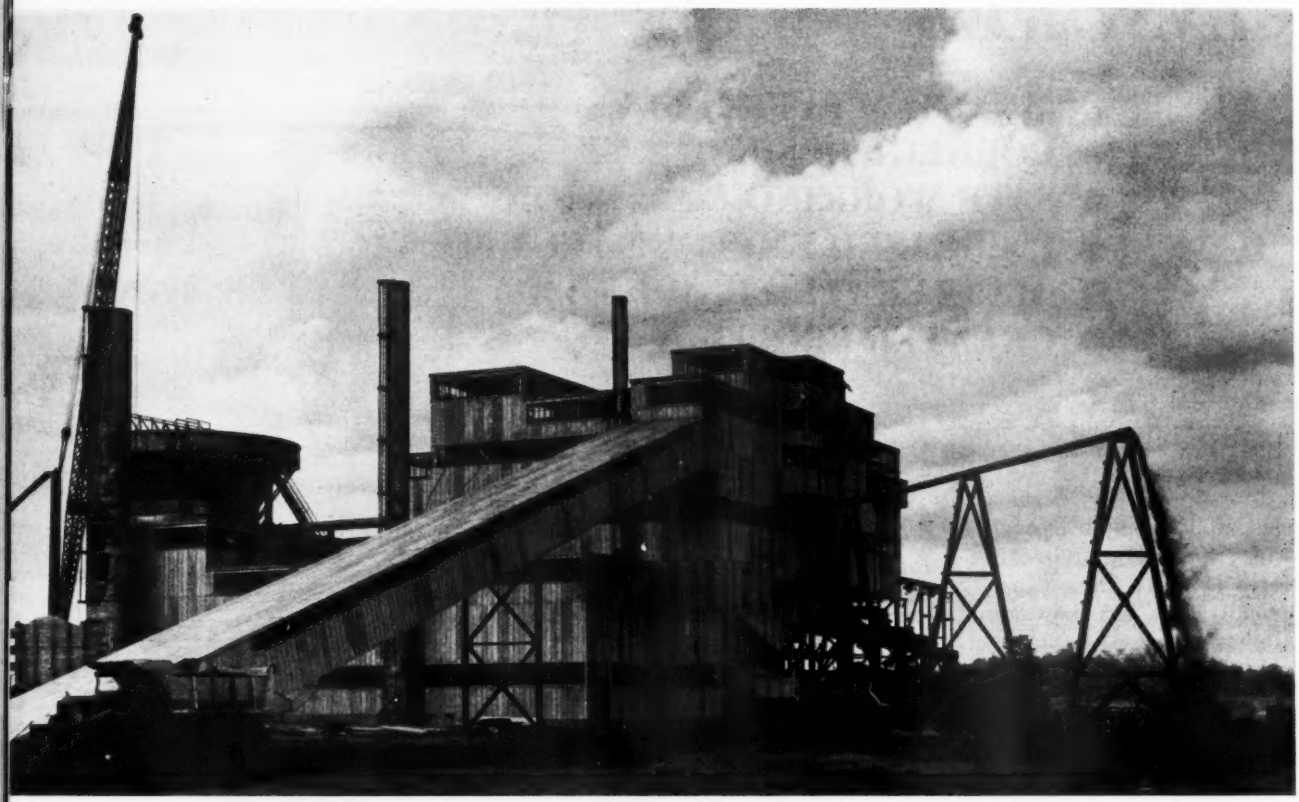
Send for Bulletin No. 739.

VISIT OUR DISPLAY AT COLORADO SPRINGS

THE JEFFREY MANUFACTURING COMPANY

COLUMBUS, OHIO

TECUMSEH ELECTRIFICATION Provides *Flexibility* and *Safety*



Exterior view of tipple building. Input to tipple is 1,000 tons of coal per hour, motor load totals 1,800 hp.

● ***Equipment of Latest Design Utilized in Meeting a Power Load of About 3,600 Horsepower, Divided Roughly 50-50 Between Mine and Preparation Plant***

F. B. JANEWAY
Chief Electrician,
Tecumseh Coal Corporation

W. D. DRUMMOND
Electrical Engineer
Westinghouse Elec. & Mfg. Co.

THE flexibility of electric power supply with maximum safety for workers is particularly significant at Tecumseh Coal Corporation's new strip mine near Dickeyville, Ind. Other noteworthy engineering features include automatic reclosing breakers for reliability, portable sled substations to prevent power waste and a special reactor in the grounded neutral of the secondary of the pit transformers to limit the voltage in case of ground faults on cables or motors.

Strip Mine Layout Analyzed

After the land was obtained the crop lines of the strip mine were studied to determine the best locations for the tipple, the tipple substation, the pit substation, the pole line with laterals for power transmission, and the point at which the first stripping and loading operations will begin. The pit substation is generally of more or less portable construction as its location is changed every few years. However, the locations of the tipple, the tipple substation and the pole lines remain fixed for 20 to 25 years, so the decision is a big one. An important part of this key problem is the high voltage power distribution system from the pit substation to the stripping and loading shovels and to the tipple building. Besides utilizing newest engineering developments, it was desired to provide more and greater safety to the men working in the pit and around the shovels.

Many of the unusual features of design and the safety precautions now in use at the Dickeyville mine are the results of the management's past operating experiences at their strip mine at Boonville, Ind. For example, at Boonville in February 1937, for the first time in a coal stripping operation in this country, a reactor was installed at the pit substation in the grounded neutral of the star-connected transformer secondaries to hold the potential from the frame of the shovels to about 100 volts in case of a grounded phase cable or motor.

Huge Stripper Feeds 7½ Cubic Yard Loader

In operation at the Dickeyville mine is the largest stripping shovel now in use, Fig. 1. This Marion Type 5561 stripper with its 35 cubic yard dipper and 105-ft. boom requires 1,275 hp.

The electrically driven loader, Fig. 2, has a 7½ cubic yard dipper and requires 275 hp. at 4,150 volts for its operation. Allowing one ton of coal to a cubic yard, only seven or eight bucketfulls are required to load one of the five 50-ton gasoline engine driven trucks used to transport the coal to the tipple.

The main motor-generator set for this Marion Type 4121 loader consists of a 275 hp. 3 phase, 60 cycle, 4,150 volt induction motor driving a 165 kw. 250 volt d.c. hoist generator, a 34 kw. 250 volt swing generator, a 27 kw. 250 volt d.c. crowd generator and a 10 kw. 125 volt d.c. exciter. The 250

Fig. 1. Electric stripping shovel with 105-ft. boom and 35 cu. yd. dipper. The motor load totals 1,275 hp.

Fig. 2. Electric loading shovel with 7½ cu. yd. dipper, loading one of the 50-ton trucks used to transport coal from pit to tipple. Main drive is a 275 hp. 4,150-volt motor-generator set

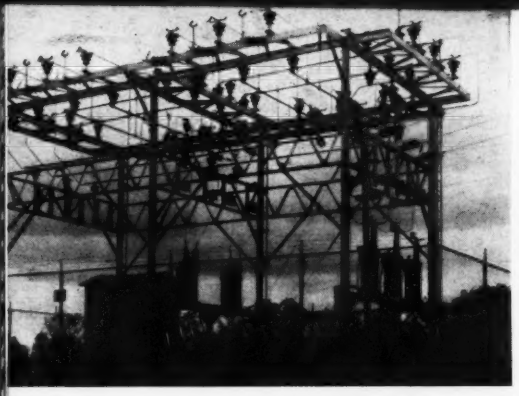


Fig. 3. Pit substation is fed by 33-KV line from this outdoor switching station of Southern Indiana Gas and Electric Co., near Lynville, Ind.

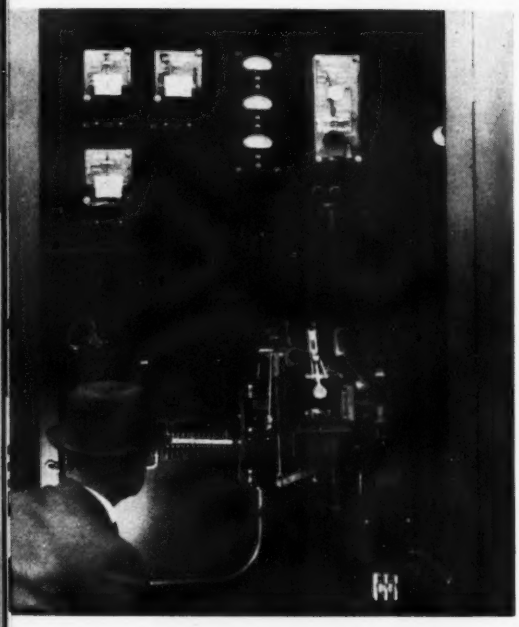
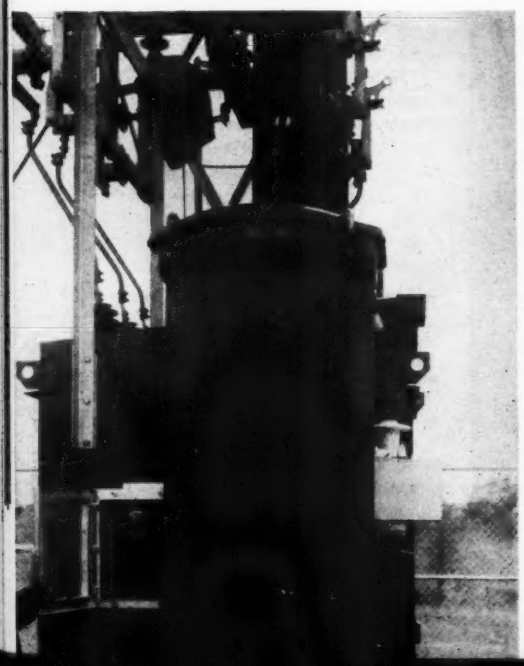


Fig. 4. Interior view of the Westinghouse outdoor switchhouse at pit substation



volt d.c. hoist, swing and crowd motors total 225 hp.

Mounted on the shovel is a 15 kva. 2,300/240-120 volt 3 phase dry type transformer bank for operating five 240 volt induction motors totaling 10¾ hp. as well as supplying the house and flood lighting.

33,000 Volt Purchased Power Reduced to 4,150

Power is purchased from the Southern Indiana Gas and Electric Company at 33,000 volts, 3 phase, 3 wire, 60 cycle, through the public utility's new outdoor switching substation near Lynville, Ind., Fig. 3.

A two and one-half mile 33 kv. pole line connects the public utility's substation with the pit substation located on the Tecumseh property. Here the voltage is stepped down from 33 kv. delta to 4,150 volt wye through a 2,500 kva. 3 phase transformer bank. On the 4,150 volt side of the transformer bank feeding the main pole line is an outdoor switchhouse with a 100,000 kva. rupturing capacity, rectox-solenoid operated, oil circuit breaker equipment with an automatic reclosing relay providing for three reclosures of the breaker before locking the breaker out of service, Fig. 4.

For safety, at this substation a reactor is placed in the grounded neutral of the star-connected secondaries of the 2,500-kva. transformer bank, Fig. 5. The oil-immersed, outdoor reactor is rated 50 amperes continuous, 2,400-volt, 60-cycle, 133-kva., single phase.

Between the reactor and the grounded point of the transformer neutral is a 50/5-ampere current transformer for operating a low energy ground relay, which is mounted with its testing switch in a weatherproof cabinet on the side of the switchhouse. The relay has a current range of ½ to 2½ amperes and trips the oil breaker in the switchhouse in 4½ seconds when the current in the grounded neutral circuit exceeds 25 amperes. The relay is given these time and current settings to delay the tripping of the main breaker in the pit substation until the breakers in the portable switchhouses controlling the separate feeders to the shovels have had a chance to clear a ground fault.

Fig. 5. The outdoor reactor, ground relay and current transformer in the grounded neutral of the secondaries of the pit substation transformer bank

Wood Pole Power Line

Power is transmitted from the pit substation over a wood pole line at 4,150 volts, 3 phase, grounded neutral. In order to carry the heavy load in the most economical manner two 3 phase circuits, each consisting of three No. 1/0 phase wires, are carried on the poles together with one No. 1/0 ground wire for the two circuits which are tied together at the substation to operate in parallel. Each lateral pole line consists of three No. 2/0 phase wires and one No. 2/0 ground wire. Each lateral line may be disconnected from the main pole line by a set of outdoor hook stick operated disconnecting switches. The ground wires of the main and lateral pole lines are grounded at every sixth pole with a ½-in. diameter 8 foot long ground rod.

Lightning arresters are installed at both ends of the main pole line and at the ends of the six laterals.

Portable Switchhouses Follow Loads

Portable outdoor switchhouses, Fig. 6, are used in the field for the control and protection of the 4,150 volt feeder circuits from the pole line to the stripping and loading shovels. These houses, weighing approximately one ton, are easily dragged about the area by a team of mules as the locations of the stripper and loader change.

Three of these houses are used on the property, only two of which are ever in use at one time. One is connected to the stripper and one to the loader while the third is moved to a position ahead of the stripper so that when the stripper has reached the end of its trail cable, the cable can be quickly connected to the newly located switchhouse. The house thus released by the stripper is moved ahead to be available for the new position of the loader. Consequently, there is always one house available as a spare in case of trouble in one of the houses in use.

Specially designed, each switchhouse consists of a self-supporting welded angle iron structure entirely steel enclosed mounted on steel sled runners. Both the front and back have hinged steel doors, and a portion of each side is removable to allow access to the equipment in the house. The roof is pitched to shed the rain, and both the inside and outside are covered with white aluminum paint. Lighting of the inside of the house is obtained from two 110 volt lamps connected to the secondary of the same potential transformer that energizes the shunt trip coil on the breaker.

Provides Automatic Protection

In each house is a group-operated three pole single throw disconnecting switch connected on the line side of a 600 ampere, 7,500 volt, manually operated, 25,000 kva. rupturing capacity oil circuit breaker, Fig. 7. The breaker is equipped with three 5 ampere instantaneous trip coils for overload protection. All copper connections are insulated, and insulating barriers are provided between the blades of the disconnecting switches.

Mounted on a steel panel in each house is a high speed low energy ground relay used in conjunction with an a.c. shunt trip coil to trip the oil breaker in the switchhouse ahead of the main oil circuit breaker in the pit substation, Fig. 8. Since most trouble is expected to occur between the portable house and the shovel, the ground relay in the switchhouse is set to trip instantaneously as an added precaution.

May Add Remote Metering

Space is left on the steel panel for the possible future addition of remote metering equipment. If this is added it will be possible to receive a continuous record of the operations of the stripper and loader on graphic meters to be located in the office of the mine superintendent.

Cables connecting the portable switchhouses to the 4,150 volt power line and to the shovels are 5,000 volt 3 conductor, shielded against corona, Fig. 6. This shielding also provides for safety in handling, and protects the conductors from mechanical injury due to falling rocks.

1,500-Foot Trail Cable

The trail cable from the stripper is 1,500 ft. long and consists of three No. 2/0, 259 strand wire, phase conductors and three No. 6, 49 strand, ground wires; the trail cable from the loader is 1,000 ft. long and consists of three No. 6, 49 strand, phase wires and three No. 12, 7 strand, ground wires. Three single pole receptacles and one single pole plug are located inside the house for connecting the trail cable from the shovel. The trail cable has a plug on the end of each of the phase wires, since receptacles, when disconnected, would become plugged with dirt when dragged along the ground. However, a receptacle is used on the ground wire of the trail cable so it cannot be accidently connected to a phase wire.

Fig. 7. Rear view of portable switchhouse showing the group-operated disconnecting switches, current transformers, and the connecting receptacles and plugs

Fig. 8. Front view of portable switchhouse. The oil breaker and disconnecting switches are operated from the front of the panel. The high speed ground relay is set to trip the breaker instantly in case of grounds on motors or cables

Fig. 6. Exterior view of portable switchhouses showing cable connection to 4,150-volt pole line by means of live line clamps and cables leaving the houses to connect to the shovels

Fig. 9. Transformer sled for pit auxiliaries. Four sets of receptacles connect the 440-volt circuits

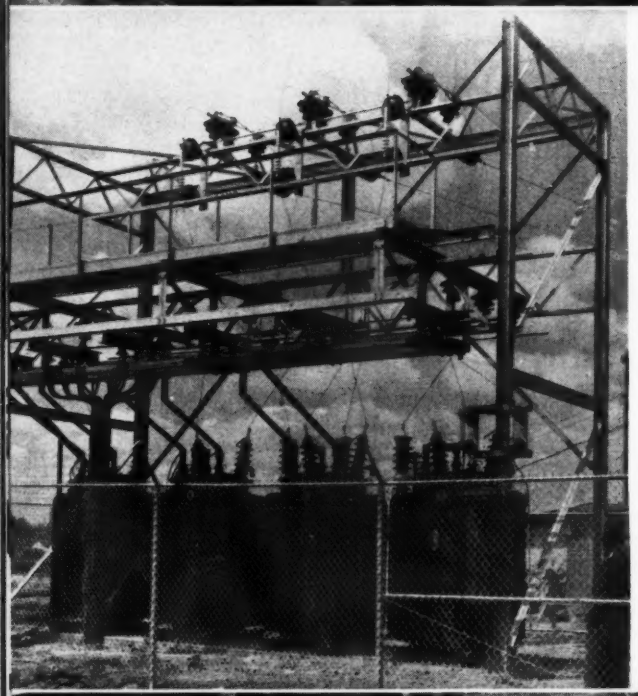


Fig. 10. Westinghouse outdoor substation at the tipple. Transformer capacity is 2,000 kva. for power and 50 kva. for lighting

Fig. 11. Main motor control desks in the tipple. All magnetic motor starters are controlled from these desks

The cable from the portable switchhouse to the power line is 50 ft. long and of the same size as the trail cable from the stripping shovel. This cable is permanently connected to the portable house, and live line clamps connect the cable to the power line. Racks are provided on the sides of the house to carry the cable when the house is moved from one field location to another.

The ground wires of the cables are connected to the shielding on the phase wires, then all ground wires are connected together and finally grounded on the metal frame of the switchhouse and shovel.

Two Portable Sleds Supply Pit Auxiliaries

Two portable sleds are used for furnishing power to the auxiliary equipment in the pit, Fig. 9. Mounted on each of these sleds is a 75 kva. 3 phase, 4,150/480-240 volt, 60 cycle transformer bank protected on the primary side by 5,000 volt fuse cutouts and on the secondary side by an automatic de-ion air circuit breaker enclosed in an outdoor weatherproof cabinet. The transformers are connected to the 4,150 volt pole line by means of live line clamps on the end of a 50 ft. length of No. 6, 5,000 volt, 3 conductor cable with three ground wires.

The low voltage circuit is divided into four outgoing feeders, all equipped with single pole sockets mounted on the sled for receiving the cables from the pit auxiliaries.

Over-Voltage Bushings Safeguard Tipple Substation

In the outdoor substation near the tipple building are four 33,000 volt transformers for the tipple load, Fig. 10. Because of the coal dust and corrosive fumes always present around a tipple, 46 kv. bushings are used on the transformers and 46 kv. insulators on all bus supports and disconnecting switches on the 33 kv. circuits.

Power for the tipple is obtained from the 480-240 volt side of the 2,000 kva. 3 phase, delta-delta connected, transformer bank consisting of three 667 kva. single phase units and one spare 667 kva. unit. Only a short time is required to make the transfer to the spare either in case of failure of one of the transformers or in case an inspection or test of one of the transformers is thought advisable.

Lighting for the tipple is obtained from the low voltage side of a 50 kva. 480/240-120 volt, single phase transformer located on the outdoor substation structure.

The low voltage power and lighting cables from the tipple substation to the tipple building are run underground. Six 500,000 CM. cables per phase are used for power and three No. 4/0 cables for lighting. All underground cables distributing power and lighting to the tipple, garage and shop are 1,000 volt Anhydrex AA-60. All intercommunicating telephone lines are located underground in the same trenches with the power cables and are of the same type wire, except 600 volt insulation is used.

1,800 Hp. Handles 1,000 Tons of Coal Per Hour

With an input of 1,000 tons of coal per hour, the tipple load totals 1,800 hp., which is about 50 percent of the total power requirements of the mine, including the electric stripping and loading shovels. The tipple requires 78 motors from ¾ to 150 hp., exclusive of the motors on heating units.

Electrical construction embodies the latest ideas for safety and low maintenance. As all coal is wet washed and then dried, no hand picking of coal is necessary. Consequently no special lighting units are required.

The main power distribution center for the tipple is a self-supporting, entirely steel enclosed, vertical switchboard with three 800 ampere, three pole, single throw, manually operated oil circuit breakers with time delay overload protection.

Fig. 12. One of the three groups of magnetic remote-controlled motor starters in the tipple

Motor Starters Centralized

The three circuits leaving the power distribution switchboard are carried in conduits to three groups of magnetic motor starters which in turn are controlled from three sloping bench-type control boards on which are mounted groups of push buttons each with one red indicating lamp, Fig. 11. Each group of magnetic starters has a steel enclosed bus run at the top and a steel pull box at the bottom of the group, Fig. 12.

No fuses are used in the power or control circuits throughout the tipple. Thermal overload protection is afforded by individual magnetic motor starting switches. At each crusher motor there is a quick-make-and-quick-break unfused safety switch.

The tipple was designed and built by the McNally-Pittsburg Manufacturing Corp., Pittsburg, Kans. All electrical connections are made with stranded wire run in galvanized iron conduit and No. 12 wire is the smallest wire used. The electric wiring of the tipple was installed by the Swanson-Nunn Co., Evansville, Ind.

Other electrical equipment at the mine consists of a 400 ampere 40 volt d.c. arc welder, motor drives in the shop, battery charging equipment and a motor driven air compressor in the garage for the trucks.

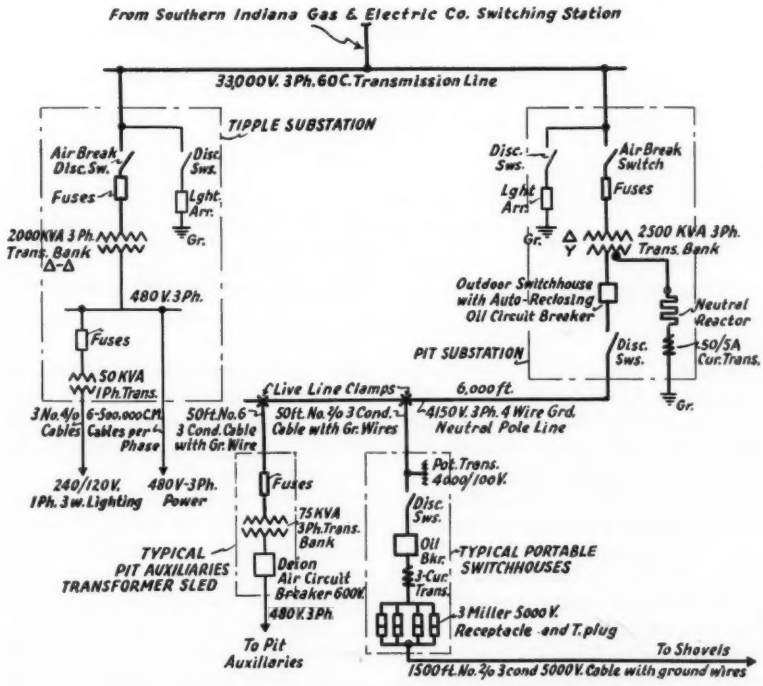


Fig. 13. Single line diagram of power distribution system

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

Gathering Systems For Conveyor Mining

• *A report by the Conveyor Committee*

THE Conveyor Committee, in preparing its reports on various mining plans that have been devised and adopted, is giving major consideration to basic or fundamental principles rather than accounts of the many different practices and arrangements to meet special conditions. A conveyor in itself is essentially a transportation device, but conveyor mining involves more than moving or transporting the coal; it combines all of the operations, from the cutting to the mine car, into a coordinated sequence. Consequently, a number of factors are involved, each of which has to be considered not only separately but in its relation to the entire system.

One of the major problems in conveyor mining is in gathering the coal, after it has been loaded at the face, to the point where it is discharged into mine cars. This introduces a number of questions. First, there is the desirability of having a sufficient number of working places, combined into a single operating unit, to provide an adequate tonnage for an economical operation. This means that several faces, or loading units, must have a main gathering conveyor onto which all of their production is assembled. When this point is reached, then the problem is to get this coal into mine cars for delivery to the tipple as quickly and cheaply as possible. As a corollary to this problem, there is the necessity of providing suitable track and switching arrangements at the mine car loading station, so that the trips can be placed with a minimum of delay, both to the haulage operation and to the conveyor loading.

There have been a number of different installations designed to meet these requirements, and the figures which are submitted with this report illustrate the more usual types. These sketches show the application of conveyors to entry development, but the track and gathering facilities described are, in main principle, applied equally to room or entry mining.

These sketches, incidentally, do not make any distinction between the type of conveyor used, as the plans are adaptable either to chain or shaking equipment. Neither do they take into account the method of loading used, as the transportation system would be essentially the same, whether the conveyors at the face were loaded by hand, duckbill, or mobile machine.

Double Entry Development

Figure 1, showing a method for driving a pair of entries, illustrates the simplest arrangement for this type of operation. The two entries are worked simultaneously and, through a short cross conveyor, the coal from both places is brought to a common loading point. This loading point is moved ahead periodically as the headings advance; the usual practice being to set the loading stations at intervals of about 300 ft.

In this arrangement, the gathering has been reduced to its minimum distance as the coal is discharged, either with or without an elevator, into mine cars immediately after it has been collected to one point. This, of course, has the advantage of decreasing the investment for equipment that otherwise occurs when a long gathering conveyor is used.

It will be noted that the figure shows two optional car loading points; both of which are more or less standard practice. One plan is to turn the gathering track, 180 degrees, through the breakthrough, as illustrated. This, however, implies a wide entry and air course in order to have room to lay the rail on a fairly easy curve. The alternate plan, as also illustrated, is to continue the loading track straight up the haulway; this requires an entry wide enough to contain the conveyor and also the loading track, which can be done in a width of 12 ft., although 14 ft. is preferable.

With the "loop" track, the cars are turned around or reversed after each trip, and this method is best applicable to a type of car that can go into the dump at the tipple from either direction. Otherwise, a switchback, or turnaround, must be provided somewhere between the conveyors and the tipple, in order to head the cars in the proper direction.

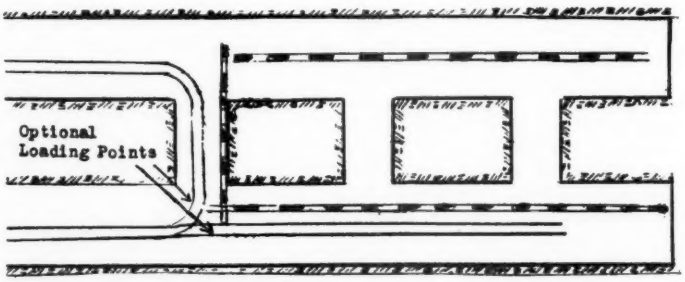


Figure 1

In either of these two plans, the straight track up the haulway can be extended as the entries advance so that when the loading point is ready to be moved ahead, the track will be already in place. If rock brushing is necessary in the haulway, it also can be done as the entry advances, providing, of course, that adequate protection can

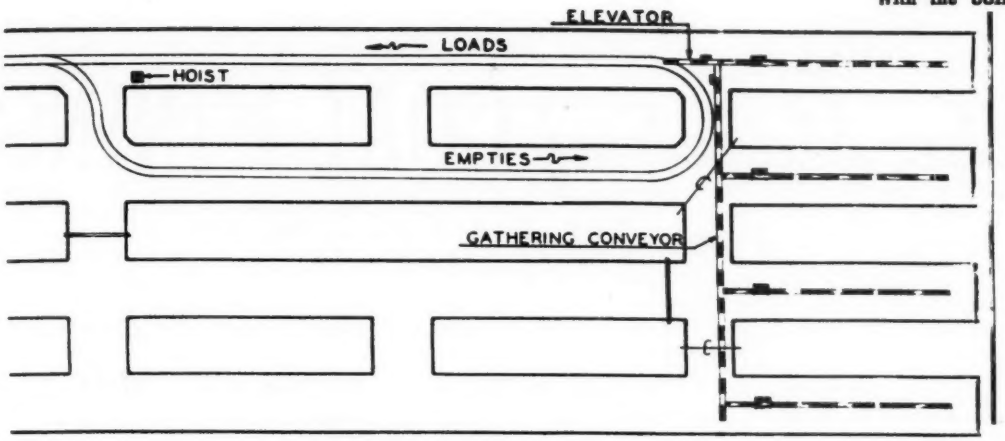


Figure 2

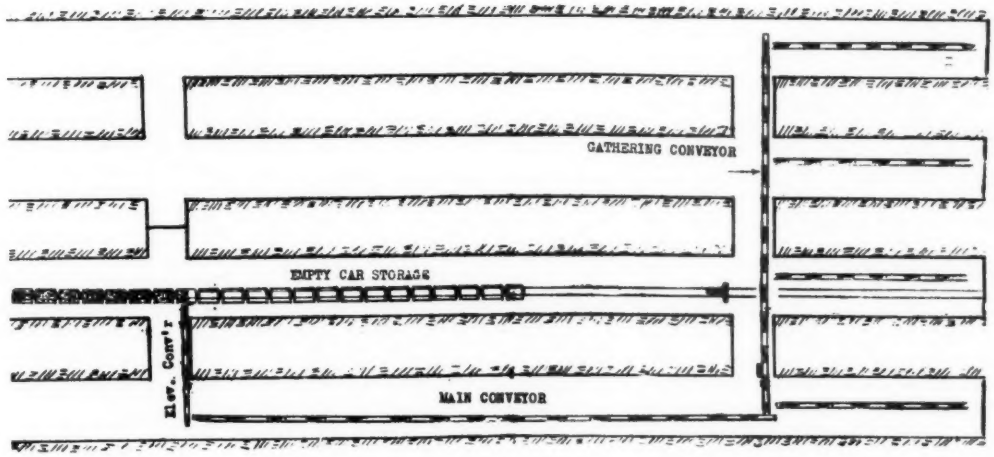


Figure 3

be given to the conveyor when the top rock is shot down.

Where the straight track is used, the entry would have to be driven from 50 to 100 ft. ahead of the loading station before the loading point could be moved ahead; this would be necessary in order to provide storage room for the empty cars. The circular or "loop" arrangement would not require this extra distance to be driven as the car loading point can be set up close to the working faces.

Multiple Entry Development

Figure 2 is an amplification of Figure 1, showing a 4-entry system in which the entry conveyors coming from the faces discharge onto a main gathering conveyor, which in turn discharges onto a short elevator that loads into the mine cars. This plan uses the "loop" loading track.

Figure 3 shows essentially the same system as far as the working places and the gathering conveyor are concerned; however, the mine car loading station and tracks are quite different. In the plan, there is a haulage conveyor 300 ft. long, extending from the end of the gathering conveyor down to a short elevating and loading conveyor laid in a breakthrough, which discharges into the mine cars. This 300-ft. distance is to provide ample storage for the mine car trips in the haulway between the loading station and the gathering conveyor.

Comparing these two installations, we find the following essential differences: Figure 2 requires a more complicated track installation, including several curves, one switch, and possibly a "switchback" to turn the cars, and also implies fairly wide entries for the curves. Figure 3 has a simple track arrangement which is easy and economical to install, but requires an extra 300 ft. of main conveyor. In both plans, the rail in the haulage entry can be laid as the entries advance so that, when the loading station is moved ahead, the track work is practically completed.

The main difference, therefore, between these two methods is the extra investment cost for the 300 ft. of gathering conveyor in plan No. 3, but this would to some degree be offset by the more economical track installation. Whichever of these two plans would prove the most advantageous at any individual mine would have to be determined by a study of the existing conditions—a procedure, incidentally, that applies to every phase of a conveyor operation.

Harlan Safety Day September 28

The Harlan Mining Institute, Harlan, Ky., plans to hold its Safety Day September 28, 1940. Practical problems in first-aid and mine rescue work are being scheduled for the event. Prizes to be awarded include: an automobile, a refrigerator, and radio.

The March of COAL MINING

Ten Years of Progress

ROOF ACTION in PILLAR RECOVERY with MECHANIZED MINING

By G. B. SOUTHWARD
Mining Engineer
American Mining Congress

THE preceding articles of this series have dealt with some of the things learned in coal mining over the past 10 years and have outlined certain fundamentals which have been found to be correct for mechanized mine operation. However, in reviewing this general progress, we find that the subject of roof action is one in which very little knowledge has been gained, and the following statement, which I wrote about 10 years ago, still appears to be true today:

"The principles governing roof action are not clearly understood. By observation we can tell what takes place in the rock immediately over the seam and also on the surface. But frequently we do not know why. And we seldom know exactly what happens between these two points. Several theories have been formulated to explain these things but none have yet been developed to where they can be absolutely depended on for every condition or system of mining. The stresses set up in the roof strata over a mined area and in the supporting coal pillars all follow known laws of physics, but the difficulty of applying these laws to control or to predict the roof movement lies in the fact that we have no accurate values for the strengths of the materials involved, and in many cases we do not even know what these materials are or how they occur."

The room and pillar method is still accepted as the standard mining system for mechanical loaders and conveyors, although the plans used for these types of equipment vary considerably from the plans originally developed for hand loading. A few attempts to use modified longwall, which come under the general classification of "long faces," have not met with any large degree of success, and although numerous experiments have been tried from time to time in most every field, the room and pillar principles have not been replaced.

Effect of Time Factor

While our knowledge of the theory of roof action is approximately where it was 10 years ago, we have nevertheless discovered some interesting facts. The rapid extraction and the concentrated mining areas with mechanized loading have very materially changed the roof behavior from what was formerly had under the slower rate of hand loading over large areas. This has clearly demonstrated that the "time factor" has a very decided effect on the way the top acts, and mechanized mining in entries, rooms and pillar recovery has almost universally resulted in a more favorable roof condition.

In mining to complete or nearly complete extraction, there are two problems. The first is to support the roof in the advance work, and the second is to cave the roof after the pillars have been drawn. In both of these efforts, the time element is an important factor. In the advance workings, most mine roofs will deteriorate as time goes on, and it is therefore obvious that the roof support problem is much simpler in a

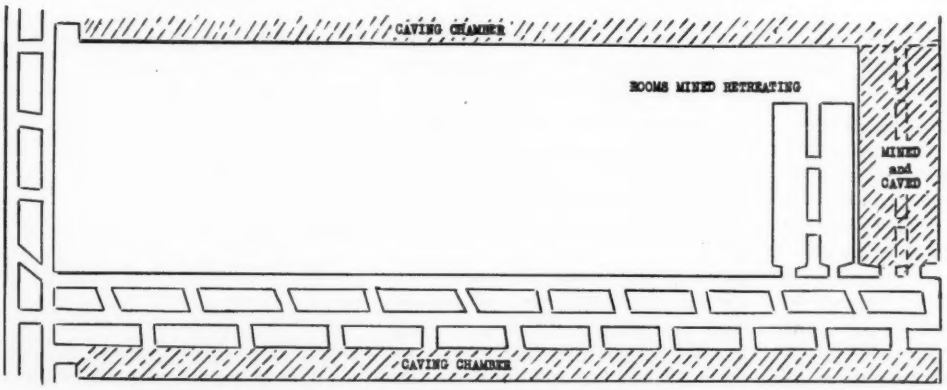


Fig. 1
Caving chambers

room which has to be maintained for a period of one month (as in mechanized loading) than in a room which may have to be supported for as long as one year (as in hand mining).

Numerous examples are evidenced in conveyor operations, where this effect is more marked than with mobile loading machines, because of the fact that conveyor mining is the most highly concentrated system that is in use today. The usual conveyor panel consists of two or more rooms in which several cuts are taken during a shift, and frequently three shifts are worked per day. This naturally confines the working territory into a very limited area, and the rate of extraction is extremely rapid. As a direct result, it is found that the width of the rooms which can be worked with safety is frequently double the width that could be worked with hand loading. To a lesser degree, this same situation exists with mobile loading machines.

In pillar recovery, conveyor mining has also resulted in a more favorable roof action, although the time element, as it affects the deterioration of the top rock, could hardly be the explanation. The real reason for the improvement probably lies in the fact that the pillar removal is systematic, the pillar lines are kept straight, and the rate of retreat is uniform. But whatever may be the cause, we do know that conveyor mining generally has a higher percentage of coal recovery and a better roof action than was had with hand loading. It has been only recently that pillars have been mined to any great extent with mobile machines, but the results there have indicated that this same favorable situation exists, although to a slightly lesser degree.

It is the usual experience in pillar mining to encounter roof difficulties in an area which has just been started, before the first fall occurs. After the first fall, the roof action is easier, and it is generally believed that this is due to relief from the weight of the overlying strata. In most cases this is undoubtedly the correct explanation.

Caving Chambers

However, another factor has definitely been found to exist, which is, that in some mines, the strata immediately over the coal appears to be under some form of internal pressure, which is not due to its own weight or that of the overlying material. This pressure may be caused either by the expanding force of water combined with fireclay, or by bending stresses from earth movements. In any case, the visible result is "bad top," but after an initial roof fall occurs, the top in the adjoining vicinity becomes "good." These falls are of such limited height and the relief extends over such a comparatively large area, that this effect must be caused by a lessening of pressure rather than a lessening of weight.

Figures 1 and 2 show how two mines have employed this principle regularly for the past 10 years. These mines are some distance apart and both are operated with conveyors.

Figure 1 shows a room panel with double entries, and with a third entry, driven wide, paralleling the air course. This is termed the "caving chamber." When the entries are being driven, this caving chamber is kept slightly in advance of the haulway and air course, and at short intervals, the timbers are withdrawn and the top caves. As a result of the falls in this chamber, the top stays solid in the adjoining entries and in the rooms. In opposition, when the caving chambers were not driven, serious difficulty was experienced in holding the roof.

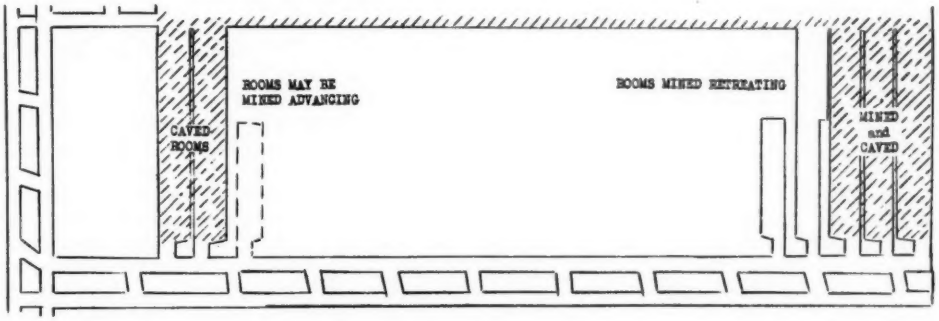


Fig. 2 Caved rooms

Figure 2 shows a different application of this same principle. In this mine, when a panel is being developed, two rooms are driven immediately after the barrier pillar has been passed. Falls occur in these rooms and after that happens, there is no further difficulty with the roof in the remainder of the panel.

Figure 3 shows an approximate section of the cover over the mine that is illustrated in Figure 2, and also defines the area mined when the first two rooms are completed. It will be noted that the initial or "relieving" falls occur in the 16 ft. strata under a strong, thick bed of sandstone. An examination of this sketch leads to the opinion that the comparatively small amount of the caved material would, in itself, hardly be sufficient to have a marked effect over any considerable area of adjoining solid coal. Therefore, since the fall does have this effect, there must be a release of some internal stress or pressure, which relieves the roof.

The two examples just cited are based on 10 years' experience, and are described here on the possible chance that this same situation may exist in other mines where it is not now suspected. If so, it is a factor which can be put to practical use in getting a more favorable roof action.

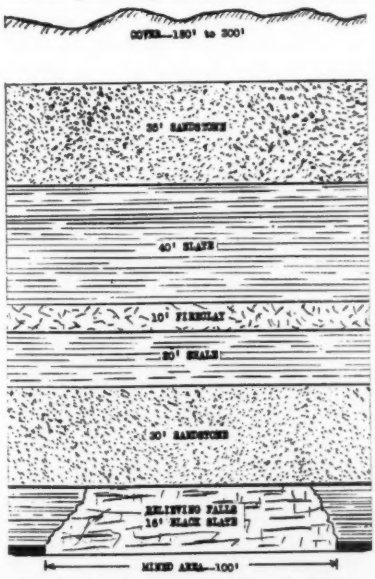


Fig. 3. Strata over mine shown in Fig. 2

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

WITH primary election activity and the campaign opening in the home districts, all Congressmen and one-third of the Senators are keeping eyes and ears trained on their constituencies, while national defense measures, appropriation bills, national guard mobilization, military conscription and the proposed excess profits tax bill are delaying the adjournment or recessing of the present congressional session. The measure authorizing peacetime mobilization of the national guard is now out of the way, but peacetime military conscription is an issue which has torn the Senate asunder and has caused an unprecedented flood of communications to Senators and Congressmen. Many believe the present session will run into November.

Taxation

Beginning Friday, August 9, five days of hearings before the full Committee on Ways and Means, with members of the Senate Committee on Finance sitting in, were held on the proposed excess profits tax bill, based upon a report rendered by the Ways and Means Subcommittee under Chairman Jere Cooper of Tennessee. After recommending amortization over a five-year period for special defense facilities, the report proposed an excess profits tax, beginning with the calendar year 1940, with rates of 25 percent on profits not in excess of 10 percent of the excess profits credit, 30 percent on profits in excess of 10 percent and not in excess of 20 percent of the excess profits credit, and 40 percent on the balance. The excess profits tax credit would be computed in two ways: "(a) The corporation may take as a credit against its net income for the taxable year its average earnings for the base period (1936-1939). The amounts so arrived at shall be increased by 8 percent of the additions to capital occurring after the beginning of the taxpayer's first taxable year under the excess-profits tax and decreased by 6 percent of deductions in capital during the same period; or (b) the corporation may take as such credit an amount equal to the percentage of its invested capital for the taxable year which its earnings during the base period bears to its invested capital for the base period, but not to exceed 10 percent or be less than 4 percent. With respect to the first $500,000 of invested capital in the taxable year, the minimum is 6 percent instead of 4 percent.

The Executive Tax Committee of the American Mining Congress, after meeting on Saturday, Sunday and Monday, presented on Tuesday, August 13, through its chairman, Henry B. Fernald, the position of the mining industry. Mr. Fernald advised the members of the Ways and Means and Finance Committees that the proposed tax should not be put into effect at least until next January, and that a too rigid excess profits tax would have an exceedingly and unjustifiably serious effect upon the mining industry. He suggested a minimum allowance of 10 percent on invested capital, and favored a 100 percent allowance on borrowed money in computing invested capital.

Stressing the necessity of restoring consolidated returns for integrated enterprises, Mr. Fernald also suggested that the taxpayer be permitted to use any two of the four base period years, 1936-1939, in computing average earnings; he explained that in the mining business there are years in which adverse conditions will depress earnings below a reasonable level, or a cessation of production may have resulted in no earnings or a heavy loss for a part of the base period. It was also noted that the average earnings method, under the proposal, is only available to corporations which were in existence for the entire four years and that it should be applicable to corporations which were in existence for one full year or more. The Committee was further told that the application of an accumulated deficit in the reduction of invested capital will be particularly detrimental to both small and larger mines, as a mine can best be maintained by keeping it open during periods of depression and the deficits which often are in major part expenditures for payroll, actually represent further investment in the property to maintain it in shape for subsequent profitable production.

The importance of special relief provisions was urged as there are many small mines coming into production which did not have "normal" earning years during the base period and will thus suffer severely unless special relief is given as in prior Acts. It was requested that the administration of these provisions be placed in the hands of a special Board, apart from the Bureau of Internal Revenue.

The Ways and Means Committee has since experienced a great deal of difficulty in attempting a hurried draft of this very complicated bill and it is believed that when the House passes the measure it will be necessary for the Senate Finance Committee to conduct hearings and give full and careful consideration to the final draft.

Coal Prices

Since the first announcement by the Bituminous Coal Division, Department of Interior, that Guffey Act coal prices would be effective September 3, there has been an extension of the effective date to October 1, and many observers believe that this will be further extended sufficiently to keep the Guffey Coal Act issue out of the political campaign. Announced prices f.o.b. mines range up to $5.25 per ton for a high grade coal in one section of the country. What the effect of these prices will be on producers and consumers in the face of severe winter demands for coal, attendant surplus of screenings, the inevitable competition of gas and oil, and probable transportation difficulties is a matter of conjecture. It must further be remembered that violations are punishable by loss of code membership which carries a penalty tax of

19½ percent on the sale price, together with suits for triple damages by non-violating code members who claim to have been injured. Under the present national emergency grave doubts are entertained as to the workability of the Guffey Coal Act, and as its original sponsors provided when it was enacted in 1937 that it should have but a four-year life, is believed by many that it will either be repealed by the incoming Congress in January 1941, or permitted to expire at the end of its life in April of that year.

Federal Mine Inspection

At a meeting of the full House Mines and Mining Committee on August 15, the report of the subcommittee was received and a motion to report the bill, S. 2420, resulted in a tie vote of 9-9. A further motion to report the bill without recommendation resulted in a similar tie vote. Members of the Mines and Mining Committee are reported to have said that this failure to report the bill practically ends Committee consideration for the present Congress. Representative Kent Keller of Illinois, author of the companion bill in the House, has placed a petition on the desk of the Speaker, and proponents of the legislation are very active in securing signatures. It is understood that 122 members of the House have signed the petition and if the proponents are able to secure 218 signatures, the Committee on Mines and Mining will be discharged from consideration of the bill and the measure can then be brought out on the House floor for action.

Everyone having a sincere interest in the safety movement in this country should at this time communicate with his representative in Congress and express his views on this harmful measure. The great preponderance of the testimony before the Committee on Mines and Mining demonstrated that the best aid to continued progress in mine safety will be to provide the Health and Safety Branch of the Bureau of Mines with additional appropriations, so that trained safety men and engineers may be available on call to assist coal mine managements and state inspection departments in their work for the prevention of accidents.

National Labor Relations Board

The Senate Committee on Education and Labor has recently heard AFL and NAM witnesses present the views of their respective organizations on the Howard W. Smith amendments to the National Labor Relations Act, which were passed by the House in June with a vote of 258—129. In the last week of August the Committee is hearing Chairman Mary Norton of the House Labor Committee and Representative Smith, author of the bill, as well as Chairman J. Warren Madden of the Board. Further delay may be created in case time is set aside for CIO representatives. A close vote is anticipated when the Committee finally considers the question of reporting the bill to the Senate for action. Whatever action is taken may be affected by the fact that the term in office of Chairman Madden expires automatically on August 31.

In both the National Guard Mobilization bill and the peacetime conscription bill there was originally a proviso making it an "unfair labor practice" under the National Labor Relations Act, in case an employer should refuse to rehire a military trainee returning from service. After the National Guard bill had passed the Senate the House Committee on Military Affairs amended it to provide that United States District Attorneys shall represent the employe in any case of dispute over reemployment. Jurisdiction is under the Federal District Court rather than the National Labor Relations Board and provision is made for speedy handling by advancing cases on the Court calendar. The bill has now become law in this form. The peacetime conscription bill, which passed the Senate August 28, provides that trainees shall be considered as being on furlough from their jobs and also invokes the assistance of Federal District Attorneys and Courts in cases of alleged reemployment discriminations by employers.

Wage-Hour

Administrator Philip B. Fleming, Wage-Hour Division, U. S. Department of Labor, recently made public two administrative determinations of importance to mining. The first of these clarifies the attitude of the Wage-Hour Division with respect to "leasers" in metal mines. The determination reads in part: "If a particular lessee is operating mining property which is not a part of the property currently being operated by the mining company with regular employes, and if in the lease agreement the mining company does not have the right to control the lessee in his operation of the mining property, it may well be that the lessee is not an employe of the mine owner but is in fact an independent operator of such property." Colonel Fleming states, however, that *employes* of the lessee are under the Fair Labor Standards Act if the products of the mine move in interstate commerce; hence, if the lessee does not pay his own employes in accordance with the Act, Section 15 (a) (1) (the so-called "hot goods" Section of the Act) prohibits the mine owner from shipping the products of the leased mine in interstate commerce.

The Administrator also put an end to the attempt of Wage-Hour Division field agents to count as "time worked" the span consumed in coal mines in traveling to and from the working place. He stated that the

(*Continued on page 72*)

View of north end of the Capitol from the Union Station, showing the Reflecting Pool *Harris & Ewing*

Development of Sink-and-Float

(*Continued from page 29*)

eners contains about 2 percent solids, and the underflow about 15 percent solids. These thickeners are the main source of medium storage.

Primary Thickener Pumps and Primary Magnetic Separators

The thickened pulp is pumped by 3-in. Wilfley manganese lined pumps into 36-in. wide Crockett type electro-magnetic separators. Here the ferro-silicon is cleaned from non-magnetic material. The overflow of these units flows to the 50-ft. thickener, and the clean ferro-silicon flows to 10-ft. thickeners.

Sands from the primary magnetic separators flow into a 24-in. wide magnetic separator of the same type. The overflow of this unit also returns to the 50-ft. thickener, the sands to the fines treatment unit and the clean ferro-silicon to the 10-ft. thickeners. This separator also treats the sludge from the 50-ft. thickener.

Secondary Thickeners

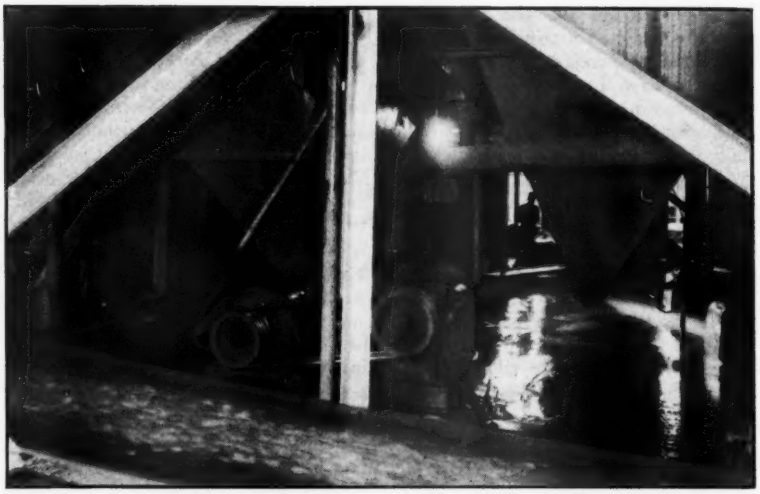
These thickeners are 10-ft. in diameter and are used to reduce the water content of the pulp prior to final thickening in Akins type specially designed thickening units. Overflow from these 10-ft. thickeners also flows to the 50-ft. thickener.

These screw type thickeners have 24-in. spirals, and raise the gravity of the cleaned ferro-silicon pulp to the desired gravity (usually from 3.5 to 3.6). The overflow of these spirals passes into the wash water sumps.

Demagnetizing Coils

The Akins thickened product is dropped through alternating current demagnetizing coils, and the residual magnetism of the ferro-silicon particles destroyed. This medium then flows directly to the separating cones.

This thickener is the final protection against loss of medium. The overflow is pumped to the screen sprays in closed circuit, and the underflow pumped to the cleaner magnetic separator by a 3-in. Wilfley manganese lined pump.



Ferro-silicon medium, with some ore, after passing through the washing screens collects in the above sump, from which it is pumped (front center) to the cleaning circuit

Cleanup and New Medium

The basement has a concrete floor sloping to a clean-up elevator boot. Any spillage and makeup medium is washed into this belt-and-bucket type elevator which discharges onto the tailing screens for the removal of refuse, and the medium enters the circuit via the tailings wash water.

Density Control

Massco density indicators are used to indicate the specific gravity of the 8-in. Wilfley medium circulating pump discharges. The indicators control motors which raise or lower the spirals in the Akins thickeners, thereby controlling the gravity of the cleaned medium returned to the cones. This eliminates the necessity of manual measurement and control of specific gravities.

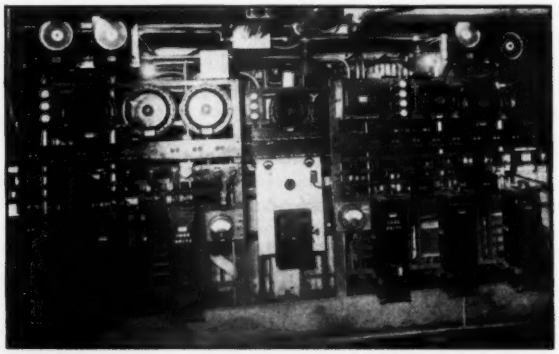
These units are housed in an all-steel building; during 1939, while in the stage of development, they treated over 300,000 long tons of feed. During 1940 upwards of 1,000,000 long tons of feed will be treated, which definitely removes the ferro-silicon sink-and-float process from the experimental stage to commercial practice.

The cost of operation and investment per ton are very close to jig practice, whereas results are superior on the sizes treated as shown heretofore.

In non-ferrous fields, the ferro-silicon sink-and-float process will find application in the saving of crushing costs, since the increased efficiency allows treatment at coarser sizes. Here it will be used primarily as a rougher process to be followed by some finishing method of concentration, such as flotation.

The process is also being developed to treat ores down to 20 mesh or lower.

Thickened pulp is pumped into Crockett electro-magnetic separators (shown above), where the ferro-silicon is cleaned from non-magnetic material



Electrical control panels for the two-unit plant

THE LATEST DEVELOPMENT IN THE USE OF THE SINK AND FLOAT METHOD FOR CONCENTRATING ORES

Millions Of Tons Are Being Treated Annually By MBI

MBI TESTING SERVICE AVAILABLE

Address all inquiries to

AMERICAN ZINC, LEAD AND SMELTING COMPANY

PAUL BROWN BUILDING • ST. LOUIS, MISSOURI

PERSONALS

J. D. A. Morrow, formerly president of the Pittsburgh Coal Company, has resigned that position to become president of the Joy Manufacturing Co., Franklin, Pa.

Mr. Morrow, one of the founders of the Joy Manufacturing Company was sales manager when he left the manufacturing company to assume duties as sales vice president with the Pittsburgh Coal Company in 1926.

Mr. Morrow will remain a member of the Board of Directors of the Pittsburgh Coal Company. He succeeds **W. E. Barrow** as president of the Joy Manufacturing Company, who is now chairman of the board.

Directors of Roan Antelope Copper Mines Limited and Mufulira Copper Mines Limited announce that **Frank Ayer**, who has been general manager of these two companies since 1933, will be consulting engineer from November 1, 1940.

R. M. Peterson, manager of Mufulira Copper Mines Limited, will succeed Mr. Ayer.

Clarence L. Seaman, well-known equipment salesman, has been appointed district manager of the Cleveland Rock Drill Co., with headquarters in Berkeley, Calif. The company has also opened an office with service and supplies at Wallace, Idaho, with **Clarence F. Zeuch** in charge.

Carl A. Zappfe, Jr., metallurgist at the Battelle Memorial Institute, Columbus, Ohio, was joint author of a paper, "Metallurgical Aspects of Hydrogen in Electroplating," that won the 1940 Proctor Memorial Award of the American Electroplaters' Society. The $100 award is given for the best technical dissertation presented before the educational session of the society at its annual meeting. The prize-winning paper was based on studies carried out in the Battelle Laboratories.

Anthony William Deller, outstanding patent attorney, has been named patent counsel for the International Nickel Company. Dr. Deller is heading a newly created patent department of the company.

Dr. Deller has been associated with the International Nickel Company for the past ten years in the capacity of chief consultant on patent affairs.

G. S. Wellman, who for the past three years has been publicity director of the Cleveland Chamber of Commerce, has resigned from that position to become associated with the Oglebay, Norton and Company.

R. L. Wilhelm, formerly superintendent of the New Jellico Coal Company, Jellico, Tenn., operated by Walter Bledsoe and Company, has been made general superintendent. **Howard Sager** succeeds Mr. Wilhelm as superintendent.

August Grunert, Butte, Mont., secretary of the Mining Association of Montana, was recently reelected president of the Alumni Association of the Montana School of Mines.

J. A. Williams has been appointed general superintendent of the Alaska Juneau Gold Mining Company operations. Mr. Williams succeeds the late **L. H. Metzgar.**

Further changes in the company are the appointments of **E. G. Nelson** as chief engineer, and **Livingston Wernecke**, formerly consulting geologist of the company, to the position of consulting engineer.

G. W. Sweeny has been appointed auditor and **C. S. Wardley**, treasurer of the H. C. Frick Coke Company and other coal-producing subsidiaries of the United States Steel Corporation.

Other appointments in the coal companies include: **C. L. Albright**, vice president and secretary; **H. G. Turner**, assistant secretary, United States Fuel Company; **K. L. Konnerth**, assistant chief engineer; **E. C. Anderson**, electrical engineer; and **J. Lowell Miles**, employment manager, H. C. Frick Coke Company.

R. D. Chamberlain, vice president in charge of production and sales of the Bair-Collins Company, has resigned due to ill health. He will be succeeded by **G. E. Gildroy**, who has been promoted from mine superintendent.

Frank W. Wilshire was recently elected vice president of sales of George M. Dexter, Inc. Mr. Wilshire has had wide experience in the coal industry, serving as assistant general manager of the Davis Coal and Coke Company, vice president in charge of both sales and distribution of tonnage for the Consolidation Coal Company, and vice president in charge of sales for the Island Creek Coal Company.

G. Cook Kimball, executive vice president, United States Steel Corporation of Delaware, is making his headquarters at Washington, D. C. **B. F. Fairless**, president, United States Steel Coporation, in announcing this appointment, states that this change is for the purpose of providing the fullest cooperation by the United States Steel Subsidiaries in serving the needs of the national defense program. Mr. Kimball's former headquarters were in Chicago, Ill.

Charles H. Rhodes, vice president of United States Steel Corporation of Delaware, will assume activities and duties of the Chicago office in Mr. Kimball's temporary absence.

J. M. Patteson, superintendent of Toms Creek operation of Virginia Iron, Coal & Coke Co., was transferred July 1 to Leona Mines, Va., as superintendent of Imperial and Monarch operations, succeeding **J. C. Trevorrow**, resigned. Succeeding Mr. Patteson as acting superintendent of Toms Creek operation is **F. Harper Hull.**

William P. Laseter has been appointed manager of the new export division, John A. Roebling's Sons Company, Trenton, N. J.

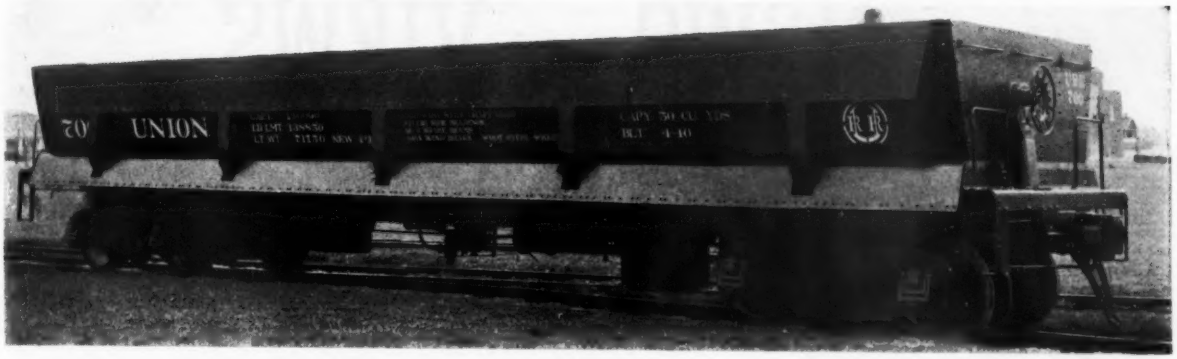
Mr. Laseter came to the Roebling Company from the Oil Well Supply Company, where he served as assistant manager of the export division, as well as president of Cia. Consolidada "Oilwell," S. A., their Mexican subsidiary.

—*Obituaries*—

George A. Bowen, treasurer, Pocahontas Fuel Company, died at New York City, August 6. His age was 54. Mr. Bowen had been associated with the Pocahontas Company since 1911, with the exception of a short time during the World War, during which he served with the armed forces.

William L. Fewsmith, manager of publicity and advertising for Robins Conveying Belt Company, Passaic, N. J., died after a brief illness while on vacation at Port Carling, Ontario, Canada, August 15, at the age of 61. Mr. Fewsmith joined the Robins Conveying Belt Company in 1913 as a civil engineer and had been continuously employed both in the capacity of civil and mechanical engineer until 1924, when he was appointed head of the Publicity and Advertising Department.

DIFFERENTIAL STEEL CAR CO., FINDLAY, OHIO



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RUGGED
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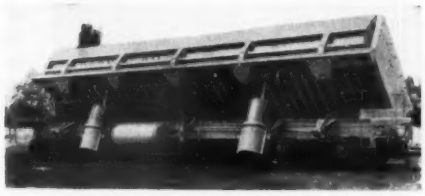
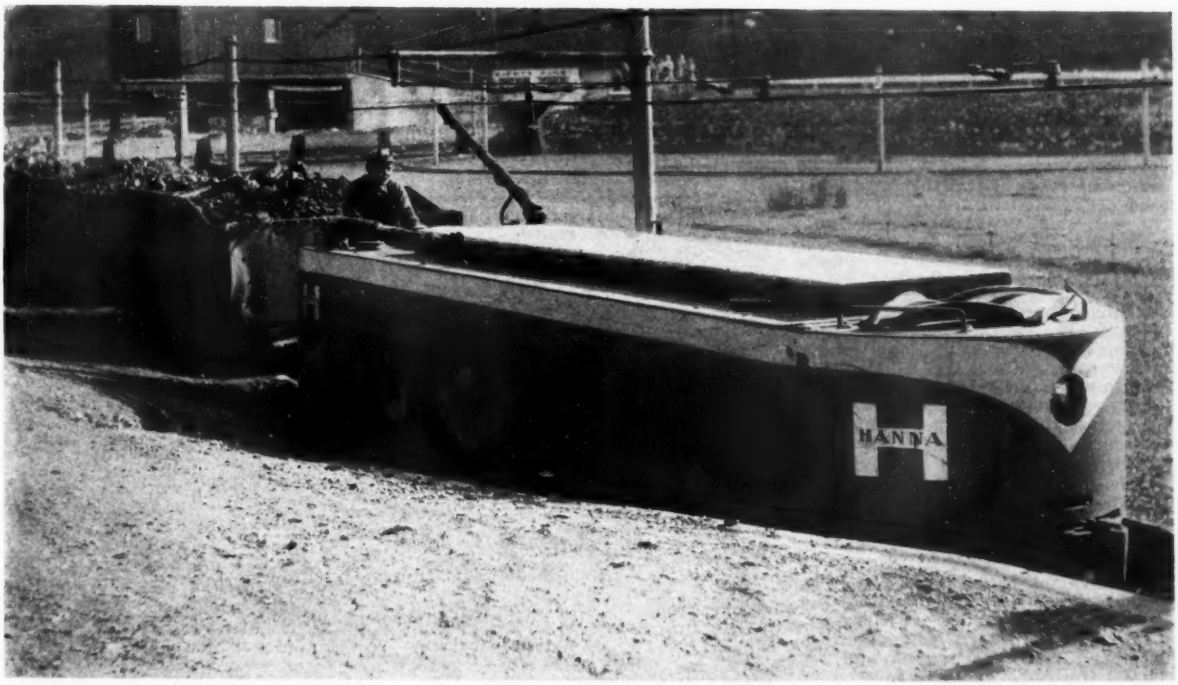


50-YARD DIFFERENTIAL AIR DUMP CAR

2-WAY AUTOMATIC DUMPING

DOWN-FOLDING DOORS



DIFFERENTIAL AXLESS LOCOMOTIVE and AXLESS CARS

Speed With Safety

DIFFERENTIAL LOCOMOTIVE and CAR WORKS

FINDLAY, OHIO

NEWS and VIEWS

Central Mill Chat Loading Facilities Improved

The Eagle-Picher Mining and Smelting Company, in conjunction with the Baxter Chat Company and the Frisco Railroad, recently completed a semi-elliptical trackage northeast of its Central mill to facilitate the loading and uninterrupted movement of chats in railroad cars, according to an announcement by Dick Stroup, of Baxter Springs, company engineer.

The completed project facilitates switching that permits feeding empty cars onto double tracks, where they are loaded and weighed; thence, by gravity, they go to storage tracks which lead to the main line. Normal capacity of chats from the mill feed alone is 130 cars per day, which can be supplemented by two drags to the tailing pile north of the mill. The drags, one of which is a new construction, increase the daily capacity to around 165 cars.

As a part of the "streamlining" program completed at the mill under the supervision of Elmer Isern, of Miami, chief metallurgist and general mill superintendent of the company, a screening and crushing plant has been installed in connection with the disposal of tailings, which permits production of several different sizes of chat materials from the waste by-product of the mill.

Safety Campaign Via Radio

Thirteen coal operators in Logan County, W. Va., are currently sponsoring a 13-week King Koal Variety Show over Station WLOG, designed to present safety in such an entertaining manner that men working in the mines throughout the county will be made thoroughly "safety conscious."

The program goes on the air every Sunday afternoon from 4 to 4:30. Employes of the sponsoring coal companies are presented on each program.

To accomplish the safety objective, the advertising agency handling the program has created a character, "The Old Inspector," who describes a mine accident each week and requests the radio audience to send in solutions. The winner of each week's contest is the guest of The Old Inspector on the following week's program.

Coal companies sponsoring this unique radio series include: Island Creek Coal Company, West Virginia Coal and Coke Company, Monitor Coal and Coke Company, Mallory Coal Company, Guyan Eagle Coal Company, Elk Creek Coal Company, Buffalo Chilton Coal Company, Winisle Coal Corporation, Clean Eagle Coal Company, Gay Coal and Coke Company, Utilities Coal Company, Georges Creek Coal Company, Hutchinson Coal Company.

Anaconda Receives Government Ore Contract

A contract to furnish 240,000 long tons of concentrated manganese ore to the Metals Reserve Company, a Government corporation, has been awarded the Anaconda Copper Mining Company. Delivery is to be made at the rate of 80,000 tons annually.

The ore will come from the Emma Mine in Butte, which is operated under lease by Anaconda. The Butte Copper and Zinc Company is owner of the property.

Ore will be shipped to Government supply depots to establish a stockpile of manganese concentrates.

While the contract with the Government calls for delivery of 80,000 tons of high grade concentrated manganese, Anaconda is increasing the capacity of the mining property to handle 300,000 tons of ore to yield 100,000 tons of high grade concentrate per annum. This will call for a daily output of around 1,000 tons from the property of Butte Copper and Zinc and will be accomplished by connecting underground the shaft of the Emma property with the larger shaft of the Original Mine of Anaconda, a short distance away.

In addition, Anaconda will spend $1,500,000 at its Butte properties for construction of a nodulizing plant at Washoe Reduction Works and for conversion of a section of the present copper concentrator into a manganese concentrator. The company has been given nine months in which to accomplish these additions but actual production of the ore will start long before the expiration of the nine-month limit. It is expected that through the Anaconda developed concentration process that the grade to be delivered to the Metals Reserve Company will average 58 percent or better manganese content.

This latest development in the procuring of strategic metal reserves followed closely the announcement of an agreement by the Metals Reserve Company with the International Tin Cartel for purchase of 75,000 tons of tin at 50 cents a pound. This purchase is to be spread over a one-year period.

West Virginia University Plans New Mineral Industries Building

West Virginia University has announced plans for the addition of a modern Mineral Industries Building.

Plans and specifications have been completed, and construction of the proposed six-story building, covering a ground area of 310 by 72 ft. is expected to get under way in September.

President Charles E. Lawall, himself a former director of the School of Mines of the University, and D. L. McElroy, the present director, say they hope to begin use of the structure at the opening of the 1941-42 term.

The building will house not only the School of Mines but also the chemi-

cal engineering department, the department of geology, and the State Geological Survey, which is located at the University and works in cooperation with the institution's geology department.

One of the outstanding features will be the installation of model mine entries in the basement for ventilation studies, timbering, survey, and other inside mining work.

The cross section of these entries will be 6 by 8 ft. and they will have a total length of 657 feet. Connected to this tunnel system will be a centrifugal mine fan with a capacity of 13,000 cubic feet per minute and a latest type, two-stage axial flow fan of the same capacity. Arrangements will be made to heat the air entering the fan room to give temperature control. The basement will also have a completely equipped rescue room which will be occupied and used by the West Virginia Department of Mines.

The ground floor of the new building will cover the full area of 310 by 72 ft. and will include a large lecture room seating approximately 300. In addition, there will be machine shops, a coal preparation laboratory, 69 by 40 ft., a chemical engineering laboratory 73 by 40 ft., and two research rooms for this latter department.

The coal preparation laboratory will contain coal bins of 25-ton capacity, crushers, screens, and numerous types of coal washers and ovens, in addition to facilities for testing the cleaning characteristics of all types of coal. Another feature of the laboratory will be a complete pilot unit for testing and concentrating ores. Adjoining it will be a complete sample preparation room with crushers, pulverizers, riffles, screens for all purposes, and space for preparing all types of ore and coal samples. Also adjoining will be a room serving as a combustion laboratory where stokers and other firing equipment will be used and research conducted on it.

The first floor also will have five classrooms, a drawing room, the reception room, a special classroom for instruction in mine surveying, the offices of the School of Mines, and an oil and gas measurement laboratory 60 by 25 ft.

The second floor will open at each end of the building on to terraces which form the roofs of the two large laboratories of the School of Mines and department of chemical engineering. These terraces will be used primarily for weathering tests and other research on coals and other mineral products. This floor will have five large classrooms and will quarter the offices of the chemical engineering department and an electro-chemical laboratory with equipment for electroplating and cleaning, battery charging, and experimental checking of standard units of electrical energy transfer. Also, there will be a modern metallurgy laboratory, and a fuels laboratory.

The area of the third floor will be 227 by 68 ft. Here will be located the geology department and a museum, as well as six classrooms.

The fourth floor will house the West Virginia Geological Survey with its offices, laboratories, record rooms, testing equipment, and other facilities.

The top floor provides space for ventilating fans, compressor equipment, vacuum pumps, elevator machinery, and other building fixtures.

Thus the proposed building will bring all departments interested in the technical phases of mineral industries under one roof, thus increasing the coordination of the work of these departments.

George B. Harrington

Accepts Program Committee Chairmanship of Coal Mining Convention

It is with real pleasure that the American Mining Congress announces acceptance by George B. Harrington, President of the Chicago, Wilmington and Franklin Coal Company, of the chairmanship of the national program committee for its 18th Annual Coal Convention and Exposition, to be held at Cincinnati, April 28 to May 2, 1941.

Mr. Harrington, through his wide experience as an operating executive and his prominence in the movement for modernization of production methods, has an intimate knowledge of all branches of coal mining and is recognized as one of the industry's foremost leaders. Under his capable guidance, district committees will draft a program which will keep the industry apace of the latest improvements in mining and safety methods.

In accordance with the successful plan adopted last year, the program for this important annual gathering is being prepared months in advance, in order to permit ample time for the selection of subjects of the widest possible interest and for the preparation of papers which will materially contribute to the advancement of coal mining.

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Colorado Industrial Commission Holds First-Aid and Accident Prevention Field Day

The Industrial Commission of Colorado in cooperation with various civic and industrial groups held a first-aid and accident prevention field day at Denver, Colo., August 1. Over 2,000 persons attended the meet.

William I. Reilly, chairman of the Industrial Commission's First-aid and Accident Committee, made the opening address and introduced Mayor Benjamin F. Stapleton of Denver, Governor Ralph L. Carr, Thomas Allen, Chief Coal Mine Inspector, and J. J. Forbes of the U. S. Bureau of Mines.

The meet was divided into eight groups as follows: Coal mining, metal mining, manufacturing, utilities, common carriers, public division, boys' division, and girls' division.

Each group worked different problems, and Bureau of Mines, Red Cross, and Boy Scout standards were used in judging the work. J. J. Forbes of the U. S. Bureau of Mines served as chief judge.

Cups were awarded to the winners and runners-up in each division. The Clayton Morrison Coal Mine team of Erie, Colo., made the highest score among the men's divisions, and received a special cup from Governor Carr and a set of medals presented by the National Safety Council.

Winners and the runners-up in the mining groups were as follows:

Coal Mining—Men's Division:

(1) Clayton Morrison Mine, Clayton Coal Company, Erie, Colo., and
(2) Columbine Mine, Rocky Mt. Fuel Co., Serene, Colo.

Metal Mining Division:

(1) Climax Mine, Climax Molybdenum Corp., Climax, Colo., and
(2) Summitville Consolidated Mines.

Women's Division:

(1) Pinnacle Mine, Victor-American Fuel Co., Oak Creek, Colo., and
(2) Sterling Mine, McNeil Coal Corp., Dacono, Colo.

This contest will be an annual event, being part of a campaign directed by the Industrial Commission to reduce accidents in all Colorado industries.

Latest Approved Cap Lamp

WHEAT MODEL GW

Gives a Variety of Beam Patterns

THIS new WHEAT Cap Lamp is really many lamps in one, for with it almost any type of beam can be selected, as best suits the nature of the operation. Its light beam may be concentrated or diffused over a wide range. This degree of flexibility in lighting is offered by no other cap lamp. Its practical advantages are obvious.

With this selective lighting your men can do better work—more work. Do it without fatigue from eye-strain, and avoid costly accidents due to faulty lighting.

It's worth your while to investigate the many advantages offered by new WHEAT Lamp Model GW. Send for full information.

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Arizona Small Mine Operators Discuss State and National Problems

Several hundred Arizona mining men met at Globe, Ariz., from August 22 through August 24, for the third annual Jamboree of the Arizona Small Mine Operators Association. Loyde C. Edmonson, chairman of the Globe Council of the association, was general chairman of the gathering and was assisted by E. R. Kielgass, chairman of the Miami Council.

The program for the Jamboree was devoted to the many problems and difficulties with which small mine operators of the state are faced, including: taxes, legislation, transportation, financing, mining on state lands, water rights, and development of prospects. Also considered by the body were the strategic mineral program and the opportunities it affords small mine operators, Class C loans, benefits afforded by recent silver legislation, and the work the Arizona Department of Mineral Resources is doing for the small mine operators and prospectors of the state.

Among the papers highlighted at sessions of the meeting were the following: "The U. S. Strategic Mineral Program," by Paul Zinner, associate mining engineer, U. S. Bureau of Mines, Tucson; "Severance or Production Taxes," by Irving Wentworth, secretary, Douglas Council, Douglas; "Division of Gas Tax and Tax Free Homes," by Ernest Hall, Salome; "The Need of a Code for Mining on State Lands," by R. S. Patterson, secretary, Crown King Council, Crown King; "The Injustice of the Graduated Freight Rate," by Newton Wolcott, field engineer, Department of Mineral Resources, Globe; "Severance Taxes and How They Retard New Mining Investments," by Robert Lucey, secretary, Florence Council, Florence; "The Tax Exemption Menace," by W. V. Olin, secretary, Clifton-Morenci Council, Clifton; "Scientific Development of Small Mines," by C. E. Miller, Congress; "The Opportunities of the Department of Mineral Resources," by J. S. Coupal, Director of the Department, Phoenix; "The Large Mines' Interest in Small Mine Development," by Frank Wardlaw, assistant general manager, Inspiration Consolidated Copper Company, Inspiration; "Arizona Tax Problems," by D. C. O'Neil, chairman, Arizona Tax Commission, Phoenix; "The Enlarged Scope of the Arizona Bureau of Mines," by Dr. Thomas G. Chapman, director, Arizona Bureau of Mines, Tucson; "Wrinkles in the Industrial Insurance Laws," by Senator D. E. Rienhardt, Globe; "Mine-to-Market Roads," by A. F. Rath, state manager, Arizona Highway Planning Survey, Phoenix; "A New Program for Mining on State Lands," by William Alberts, commissioner, State Land Department, Phoenix; "Small Mine Transportation Problems," by Amos A. Betts, Arizona Corporation Commissioner, Phoenix; "Social Value of Small Mines," by Dixon Fagerberg, C.P.A., Phoenix; "Wage-Hour Law Interpretations Relating to Small Mines," by Lyman L. Dixon, Wage-Hour inspector for Arizona, Phoenix; "The Future of Silver," by George R. Hay, Patagonia; "Tax Exemptions and Real Estate Laws," by W. G. Keiser, Quartzite; "A. S. M. O. A., Its Accomplishments and Opportunities," by John Slak, Cleator; "Problems of Primary Mine Financing," by C. C. Beddone, secretary, Bisbee Council, Bisbee; "Leasing of Patented Claims Taken Over By the County for Taxes," by A. L. Smith, Kingman; "Incorporation in Arizona," by Charles P. Elmer, Kingman; "Unemployment Insurance and Its Problems," by W. J. Cummings, Nogales; "The Severance Tax Menace," by Frank P. Knight, Jr., Chairman, Winkelman Council, Christmas; "Greetings from the New Mexico Miners and Prospectors Association," by Ira L. Wright, Silver City, N. Mex.; and "Stealing and Destruction of Mining Property," by J. Hubert Smith, Kingman.

Entertainment features included a luncheon at the Cronkite Cafe, a stag party, and the annual banquet.

Metaline and Grand View Mines Speed Development

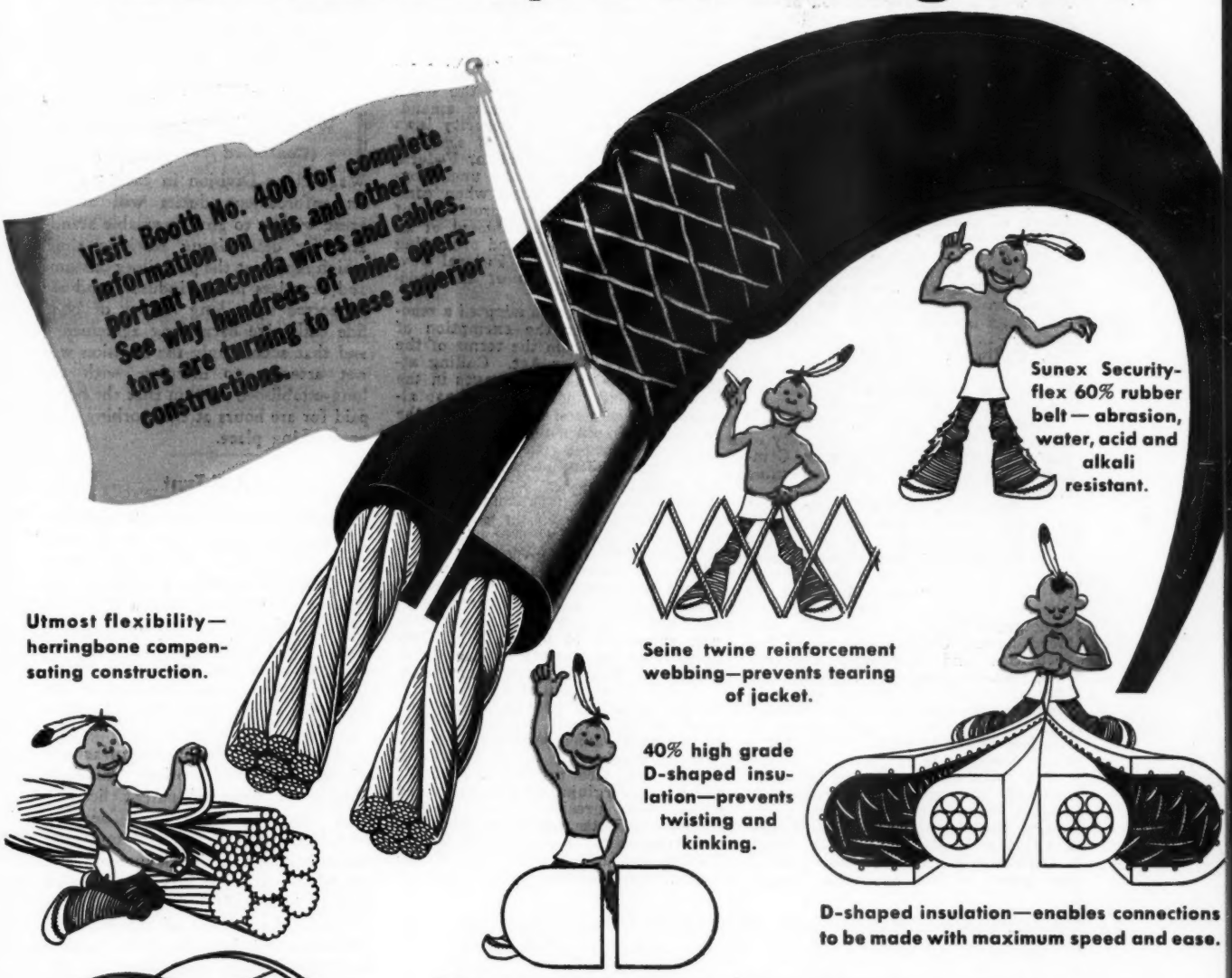
The American Zinc, Lead & Smelting Company announces the starting of operations of the Metaline and Grand View mines at Metaline Falls, Wash. The Metaline Mine will be put into production immediately, and the Grand View Mine will start producing during the first half of September.

Both properties will be operating at the capacity of the mill by the first of October, and will produce from 1,200 to 1,500 tons of concentrates per month. This will give employment to 160 men.

SUNEX

SECURITYFLEX

Anaconda's improved mining cable!


Visit Booth No. 400 for complete information on this and other important Anaconda wires and cables. See why hundreds of mine operators are turning to these superior constructions.
Sunex Securityflex 60% rubber belt — abrasion, water, acid and alkali resistant.
Seine twine reinforcement webbing—prevents tearing of jacket.
Utmost flexibility—herringbone compensating construction.
40% high grade D-shaped insulation—prevents twisting and kinking.
D-shaped insulation—enables connections to be made with maximum speed and ease.

This picture is of a piece of Type D two conductor Parallel Mining Machine Cable . . . Securityflex *with the famous Sunex jacket* is made in all types of cords and cables for every purpose . . . voltages from 300 to 7,000, shielded and unshielded, single or multiple conductors in different strandings for different degrees of flexibility.

40825

ANACONDA

USE MODERN IMPROVED **Anaconda Wire & Cable**

ANACONDA WIRE & CABLE COMPANY, General Offices: 25 Broadway, New York City; Chicago Office: 20 North Wacker Drive

Subsidiary of Anaconda Copper Mining Company. Sales Offices in Principal Cities

Mining Association of Montana Holds Successful Convention

The sixth annual convention of the Mining Association of Montana was held at Helena, August 9 to 10, and broke all preceding attendance records with a total registration of 320 delegates.

Vital problems confronting Montana mining men were discussed by prominent speakers with unusual interest being shown in addresses on the "Fair Labor Standards Act and Its Application to the Western Mining Industry," "Mineral Industries of the West," and "Securities and Exchange Acts and Their Application to Mine Financing."

Dr. Thomas T. Read, mining professor of Columbia University, New York, spoke on "Mineral Industries of the West," Friday, August 9.

Robert S. Palmer, Secretary of the Colorado Mining Association, led a discussion on the Wage-Hour Act following an address on that subject by Arthur L. Faber who represented Col. Philip E. Fleming, Wage-Hour Administrator. Mr. Palmer presented the desires for changes expressed by the association he represents.

That evening, John L. Boardman, Chairman of the Bureau of Safety of the Anaconda Copper Mining Company, exhibited five reels on mine safety.

On Saturday, at the Placer Hotel in Helena, delegates heard Dr. E. D. Gardner, Supervisory Engineer of the U. S. Bureau of Mines, Tucson, Ariz., describe the "Work Now Being Done by the U. S. Bureau of Mines on Chrome Deposits of Stillwater and Sweetgrass Counties, Montana"; and Mord Lewis, Chief Engineer of the Securities and Exchange Commission, Washington, D. C., discussed "Securities and Exchange Acts and Their Application to Mine Financing." Following his address, O. I. Deschon of Great Falls, Mont., led a discussion on this subject.

Pep talks on the Mining Association of Montana were given by August Grunert, the association's secretary, State Senator Paul W. Smith, and George R. Millen of Dillon, Mont.

Cornelius F. Kelley, Chairman of the Board of the Anaconda Copper Mining Company, spoke at the annual banquet and told an audience of 500 that he was sure the unqualified and unselfish support of the mining industry of the United States can be pledged to national defense.

Resolutions were adopted commending the work of the State Bureau of Mines; urging modifications of S. E. C. rules as regards newspaper advertising of mining securities which are exempted; requesting initiation of a mining educational campaign by the association; endorsing the small loans bill now in Congress; amending of Montana Social Security laws to provide for deduction of amounts expended by mine owners for Federal old-age benefit and state unemployment compensation taxes when compiling return of net proceeds of mines; urging re-establishment of an assay office at Helena; and protesting any interference by the Federal Government of the rights of the independent prospectors.

The association also adopted a resolution calling for the exemption of outlying mines from the terms of the federal Wage-Hour Act. Calling attention to the fact that wages in the mining industry of the West have always been fair and equitable and the relationship between employe and employer generally good, the association urged amendment of the Fair Labor Standards Act "so that the outlying mines be exempt from the hours provisions of the Act up to 48 hours per week in states where by the state law an eight-hour work-day is in effect and where the minimum wages exceed the present minimum fixed by the FLS Act by at least twenty cents per hour." A copy of this resolution was submitted to members of Congress from the western mining states and to the Wage-Hour Administrator.

Carl J. Trauerman of Butte was re-elected president of the association, marking the seventh consecutive year he has been named to this position.

O. I. Deschon of Great Falls was named first vice president, Fred M. Black of Virginia City was elected second vice president, and August Grunert of Butte was reelected secretary-treasurer. Anthony Strojan of Helena was named chairman of the executive committee.

Sectional Safety Meet

The annual sectional contest for the New River and Winding Gulf districts of West Virginia will be held in Oak Hill September 14. Robert Lilly, president of the association, predicts the participation of at least 60 teams.

No tie problems will be permitted, all teams continuing the working of problems until a winner is qualified.

Wheels of Government

(*Continued from page* 63)

Wage-Hour Division in carrying out its enforcement duties will accord great weight to any reasonable standards for determining working time, which represent the prevailing customs and practices in the industry and are supported by a long history of bona fide collective bargaining agreements, and that accordingly the Division will not attempt to interfere with the long-established custom that the hours paid for are hours at the working face or working place.

Anti-Trust

During the past month the Department of Justice held up an anti-trust suit against 21 of the larger oil companies pending a study by the National Defense Commission on the effect of the suit on the defense program. The action sought to separate transportation and marketing activities from the production end of the industry. The Anti-Trust Division also charged a group of gypsum companies with controlling manufacture, distribution and prices partially through a series of patent licenses. The American Magnesium Company of Cleveland is also placed under an order impounding its documents and records for a grand jury investigation and it is stated that this action is taken in the interest of the National Defense. It is held that some patents held by foreign companies are obstructing the use of a plastic mud made from bentonite which is necessary for casting tank treads; also that certain airplane fabrics are affected by patent control.

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TESTING COAL AND ALL MINERAL PROPERTIES - USING OUR LIGHT GASOLINE DRILLS.. THEY SAVE FUEL AND MOVING COSTS.. WE GUARANTEE SATISFACTORY AND PROPER CORES..
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ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

Oliver Building **Pittsburgh, Pa.**

U. S. Soviet Trade Pact Renewal Continues Russian Coal Exports

Renewal of the commercial agreement between the United States and Soviet Russia for another year ending August, 6, 1941, continues unconditional most-favored nation treatment to Russian commerce but contains a provision limiting the Soviet exportation of coal to 400,000 tons. This provision was deemed necessary because of the coal tax provisions of the Revenue Act of 1932 which have been continued in effect.

The State Department in announcing the completion of the agreement had this to say of coal: "The Soviet Government has renewed in a note accompanying the agreement its commitment to export to the United States in the next 12 months not more than 400,000 tons of Soviet coal which was approximately the quantity of Soviet coal exported to the United States in the calendar year 1936. While there were imports of coal during each of the first three agreement years, such imports did not in any such year amount to as much as one-half the 400,000 tons limitation. Since October 1939 there have been no imports of Soviet coal."

Rules Governing Bituminous Sales at Mines Issued by Coal Division

Rules covering the sale at mines of bituminous coal to prevent evasion of the minimum prices and enforce the law prohibiting certain unfair trade practices have been issued bv the Coal Division of the Interior Department.

The marketing rules and regulations limit sales agreements for coal to 30 days generally but provide that contracts not exceeding one year may be made with the agencies of Federal or local governments. Provisions are also included permitting the making of contracts exceeding the 30-day limit upon special permission following a showing of necessity of meeting extended competition of other forms of fuel or energy.

These regulations provide that only one discount may be allowed by a code member on a single sale and that discounts or allowances from minimum prices may be made only to persons authorized by the Division to receive them. They also provide against evasion of minimum prices or discrimination between coal producers through the terms of payment, and claims for adjustment because of alleged shipment of substandard coal.

Methods of unfair competition constituting violations of the bituminous coal act are outlined bv the Division as consignment of unordered coal or the forwarding of coal which has not actually been sold, consigned to the producer or his agent except in cases where it is consigned to the producer or his agent at rail or track yards, tide water ports, or lake ports, or docks beyond such ports when it is bunker coal, coal applicable against existing contracts, and coal for storage in rail or track yards or on docks and wharfs or at other yards for resale.

Other unfair methods included agreements to grant secret allowances, rebates, or concessions, or the prepayment of freight charges, or the predating or postdating of any invoice or contract, the use of concession gifts or bribes, false or misleading advertising, and intentional misrepresentation of analysis.

Under the terms of the regulations no code member may make unauthorized use of trade marks, trade names, slogans or other advertising matter adopted by a competitor. Splitting or dividing commissions and broker's fees or employment of any persons at a compensation disproportionate to the ordinary value of the service rendered are banned.

Effective Date of Minimum Coal Prices Delayed Until October 1

Following the filing of numerous complaints by members of the bituminous industry that the 10 days allowed for filing requests for review were inadequate, the Bituminous Coal Division of the Department of Interior postponed from September 3 to October 1 the effective date of the new minimum prices which the Government has dictated for the industry.

The minimum prices and marketing rules will become effective coincidentally.

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Advanced mine workings and tunnels are economically ventilated with *Mine Vent*. It cuts to any required length and is quickly installed by use of patented couplings and attaches to roof, rib, or side of drift. Flexibility permits folding out of way when firing shots. Special fabric resists acid water, fungus, powder fumes, and withstands severe abrasion.

If you are not already acquainted with *Mine Vent*, stop in and see us at the Western Mining Congress in Colorado Springs, Sept. 16-19. (Booth 211.)

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TUBING WILL ANSWER YOUR VENTILATION PROBLEMS

AMERICAN BRATTICE CLOTH CORP.
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Coal Division Holds Minimum Prices Effective on Government Contracts

Following establishment of minimum prices (effective September 3) the Coal Division of the Department of the Interior plans to play "watchdog" over prices of coal submitted to the Federal Government on bids. The Coal Division holds that the minimum prices should be enforced to as great an extent as possible.

Bid forms recently sent out by Government purchasing agencies contain a proviso that if on the date of opening bids for bituminous coal there has been no judicial finding that minimum prices under the Coal Act are applicable to contracts for furnishing coal to the Government, the contract will be awarded to the lowest responsible bidder conforming to specifications. Should judicial opinion decide that minimum prices are applicable to Government coal contracts, reservation is made by the Government of the right to accept the lowest bid meeting specifications after substituting the minimum prices providing the bidder's prices are less than the minimum prices. Should the Government not decide to follow this policy, it can reject all bids and readvertise.

Coal Division attorneys, even though the courts have not decided with respect to the application of minimum prices to Government contracts, are of the opinion that sale, offer, or delivery of bituminous coal at figures below the effective minimum prices would violate the Act and render the producer concerned liable to revocation of his code membership. This applies to all contracts—those made with private consumers, state or local governments, and the Federal Government.

Nickel Deposit Discovered in Arizona

Discovery of an important nickel deposit in a remote section of northwestern Arizona has been announced by W. J. Graham, Secretary of the Arizona Mineral Resources Board.

Engineers of the Columbia Steel Company, he said, are at the scene, attempting to determine the depth of of the deposit which extends for 12 miles and varies in width from 600 to 1,400 ft.

According to Graham, surface samples reveal a nickel content of .68 of 1 percent, with a by-product of platinum running from $1.50 to $3.50 a ton. Small copper content is also present, he asserted.

Anthracite Advisory Committee Meets

Early in August the Anthracite Advisory Committee, which is functioning under the cooperative research program on anthracite being carried on at Penn State College, met at Pottsville, Pa.

Dr. A. W. Gauger, director of Mineral Industries Research of Penn State College, presided and reported that extensive laboratory and field activities had been carried on since October 15, 1939, in connection with the major portion of the program which deals with an attempt to regain anthracite markets in the water gas generating field.

In making an investigation of the types of anthracite best suited to gas works utilization, numerous new laboratory procedures were developed and a number of the findings are proving very useful in pursuing the second portion of the research program which deals with the utilization of anthracite as an activated carbon. The results of this portion of the work can benefit the entire anthracite industry in peacetime activities in connection with the absorption of gases, odors, colors, and in solving many other problems of industry.

RESULTS AND SAVINGS

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R&S plants weather the "Results and Savings" test like veterans. They clean cheaply under all conditions — because the mechanized perfection of the cleaning units are supplemented by R&S experience. That's what counts!

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A new LIGHTWEIGHT STOPEHAMER

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Little Brother of the Balanced R-58

The ninety-eight lb. R-48, like its big brother, is just what the drill runners ordered. It is built upon the principle that the machine should do the work . . . not the man. In all stopes and raises this ease of operation is of vital importance.

The design of this drill enables the operator to turn out more work with less fatigue. Its easy handling makes skilled miners even more productive.

Special attention was paid to balance, weight, location of controls and to their easy positive action. These and other features combine to make the R-48, and its big brother the R-58, the easiest-handling pair of Stopehamers* ever built.

The R-48 is the fastest drilling machine we have ever built in its class but it has two other features which we believe are even more important; that is, ease of handling and durability. This machine's ability to stand up is the result of our 70 years' experience in designing and building rock drills for every part of the world.

Try this new Stopehamer. We are sure you will find that it will drill more feet of hole per shift, that it is easy on the operator, and that it stays underground and keeps drilling. These features will certainly insure lower production costs for you.

Why the R-48 is Easy to Handle

Balanced • Lightweight • Short Length
Superior Feed and Throttle Controls

These R-48 Features Mean Durability

Sturdy Piston • Long Life Rotation
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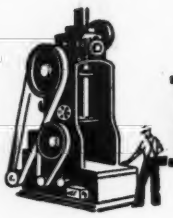


MANUFACTURERS' Forum

Motorblower

A new "Motorblower" featuring reliability, quiet operation and low cost, has just been announced by the Ingersoll-Rand Company, 11 Broadway, New York City.

In addition to reliability and quietness, the manufacturer claims numerous features which make the Type "G" Motorblower ideally suited to furnishing air for general industrial uses. The unit can be installed on any floor, since it requires no special foundation. A built-in blast gate is located in the blower discharge, and flexible pipe connections are provided for connecting either intake or discharge to shop piping.

The maintenance of constant pressure over the entire volume range is stressed as being particularly advantageous in furnishing combustion air to oil-and-gas-fired furnaces. The blower characteristics are such that power consumption varies approximately in proportion to the volume of air delivered. Type "G" Motorblowers are built in 72 sizes: pressures from ½ to 2¼ lbs. and volumes from 100 to 4,500 cfm are available. The discharge opening on all sizes can be located in any one of eight positions in steps of 45°.

Additional information is contained in Form 2671. Copies are available from Ingersoll-Rand Co., 11 Broadway, New York City, or any of their branch offices.

—■—

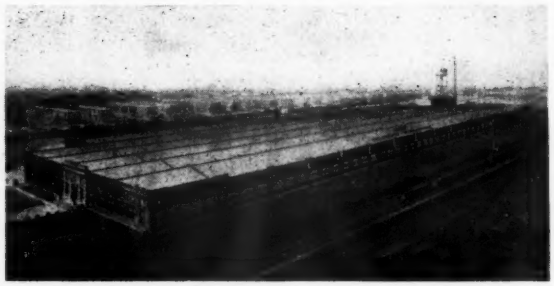
Ground Wire Bracket For Steel Towers

To provide a suitable ground wire bracket for mounting on steel structures the Ohio Brass Company, Mansfield, Ohio, has developed a device with a flat supporting piece, drilled with four holes to allow bolting to a steel tower, a fabricated steel pole or a bayonet extension. Using a clamp mounted on top of the device, this bracket, known as the Clamptop, permits an increase of spacing between ground wire and conductors of six inches or more over any other designs, assuming the same bolt holes are used. The bracket proper has two pintles on which the clamp body rests. Two carriage bolts hold the clamp to the bracket and secure the keeper piece over the ground wire. Since the clamp pivots 15 degrees above or below the neutral position, ample clearance for rocking action is provided. This flexibility, similar to that afforded by a suspension clamp, tends to prevent damage to the ground wire at the point of attachment.

The clamp seat is so designed that pressure is graded from a maximum at the keeper piece center to a minimum at the ends. Stringing the ground wire is facilitated with this type of device in that the wire can be transferred directly from stringing blocks to the clamp. The wire then is secured by simply placing the keeper piece over the wire and tightening the bolts. Total horizontal angles of 30 degrees are accommodated by the clamp seat, permitting use of the bracket for liberal line angles. Having a reversible keeper piece, the clamp holds any wire from ¼ to 9/16 in. Ample slip strength is provided for these wires. A design also is available for mounting on wood poles.

SKF EXPANDS

Material increase in the capacity of SKF Industries, Inc., will be brought about through operation of the company's new No. 2 plant, located on the Pennsylvania Railroad at Bridge Street, in Philadelphia, Pa.



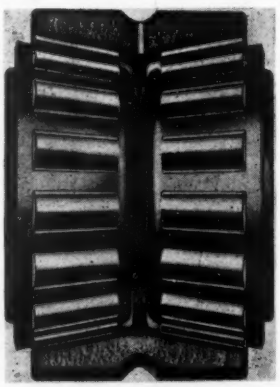
Cleaning Contract Awarded Jeffrey

Standard Coal Company of Vincennes, Ind., has awarded the Jeffrey Manufacturing Company a contract for a large 7-ft. Baum Jig to clean 450 tons per hour of 7 x 0-in. coal.

—■—

New Timken Bearing

The Timken Roller Bearing Company, Canton, Ohio, has recently released a modification in the design of the standard NA type, or non-adjust-



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able, Timken roller bearing. Made up of a double row outer race or cup and two single row inner races or cones, it is especially adapted to serve as a sheave bearing.

The races and rolls are ground to established precision limits so that when the cones are assembled into the cup the front faces of the cones contact and the proper running clearance is provided. The front cone faces are slotted and chamfered as shown to provide an entrance for lubricant to within the bearings. This feature is particularly advantageous in multiple sheave blocks where it is required that the bearings be lubricated through the pin which is stationary.

The chamfered front faces eliminate the necessity of machining a deep annular groove around the shaft to carry the lubricant to the various points of entrance in the bearing. In some sheave blocks, lubricant may be introduced through a fitting in the sheave hub, and for this design an annular groove and holes are provided in the cup.

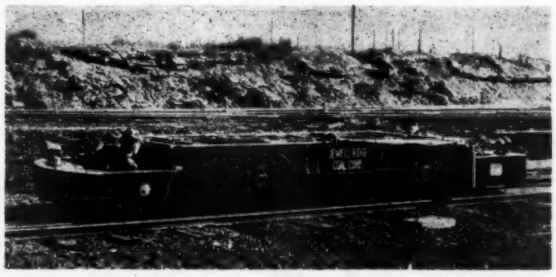
The problem of sealing the bearing chamber has been greatly simplified by extending the length of the large cone rib and creating a surface concentric with the shaft and sheave bore on which a seal may be run. These seals have the same O.D. as the cup and are pressed into the sheave bore and thus are used to hold the bearing together during assembly. The backface of the cones must protrude slightly outside the seal to establish clearance between the sheaves and the frames of the block.

The bearings are designed to a minimum width and with an I.D. large in relation to its O.D. and also with a maximum radial and thrust capacity for the space occupied.

The VALUE of SECTIONALIZING with
I-T-E
AUTOMATIC RECLOSING CIRCUIT BREAKERS
Raise production; reduce fire hazard; lower maintenance charges; decrease total energy consumption and power demand. These advantages with Automatic Reclosing Circuit Breakers are fully described in I-T-E bulletins based on actual installations in mines.
At right—Each circuit breaker controls a section, confining disturbances to the area in which they arise.
Representatives in Principal Mining Areas
BULLETINS TELL THE STORY
These bulletins deal with a variety of mining conditions. Copies will be gladly furnished on request.
I-T-E CIRCUIT BREAKER CO.
PHILADELPHIA, PA.

Low Vein Mine Locomotive Announced

The General Electric Company has announced a 15-ton mine-haulage locomotive with an over-all height of only 26 inches. The unit is able to operate in a 40-in. vein without brushing top or taking up bottom, as there is practically 8-in. clearance above the locomotive.



Over-all height has been held to 26 in. by using high-speed, body-mounted, self-ventilated motors and double-reduction gear drives. The motors are connected to the gears through drive shafts with double universal and slip joints. There are a 10-step controller, reverser, hand-brake wheel, air-raised trolley, air-brake, air-sander, and whistle valve, and adequate space for motorman and trip rider. Equalized spring suspension minimizes derailments; and overload devices protect the equipment under all conditions. The air reservoirs are contained in the two all-welded bumpers.

The two GE-1204 motors are the series-wound, commutating-pole, self-ventilated, cylindrical-frame type with Class B insulation, each with a one-hour rating of 90 hp. and a continuous rating of 84 hp. at its pinion at 250 volts d-c. The armatures are carried on anti-friction bearings in separate frame-heads. The motors are connected in parallel.

The 10-step controller provides smooth and fast acceleration with ordinary loads, and application of maximum tractive effort for starting heavy trains. The control equipment includes a small master controller with a hand-operated reverser, air-operated contactors controlled by magnet valves (solenoid-operated contactors may also be furnished), and an overload relay.

With a special type of trolley support on one side of the locomotive, the trolley base can be raised to a height which permits the pole to be swung across the top of the locomotive by merely operating an air valve. The pole can thus be set easily for trailing when the direction of travel is changed at the track terminals.

Welding Gloves

Two new welding gloves have been announced by the American Optical Company, Southbridge, Mass.

The TX100 glove is a streamlined welding glove that presents an entirely new idea of comfort, quality, workmanship and wear. Made from chrome tan horsehide and from a "gun-cut" pattern, no seams at all are exposed to active wear. All are at the back of the fingers, except at the base of the second and third fingers, and these seams are welt reinforced. The thumb and index finger are also reinforced. The inside is insulated with wool. Severe tests have proven the worth of this new glove which is made in a regular size that measures 14 in. overall, 5 in. across the palm with a 6-in. gauntlet.

The other new glove differs in design from the No. TX100 glove in the following features: Thumb and index fingers are reinforced. The back of the glove is reinforced with an outside patch—not one-piece construction.

. . . NEW GARDNER-DENVER S-33 SINKER

ADD ANOTHER champion to the list of Gardner-Denver Sinkers. It's the new S-33 Sinking Drill—weighing only 31 lb., but with speed, power and performance that lift it far above its weight class.

The exceptional speed and reliability of the S-33 result from special Gardner-Denver construction . . . features never before embodied in a drill of such light weight . . . features designed for easy portability.

For example, the S-33 has four-pawl rotation instead of the two-pawl so generally used in drills of this weight. Pawl plungers are eliminated, and pawls can be reversed for double wear. The rifle nut is of a special grade bronze made for this service.

Valve design admits air directly from throttle valve to hammer, and the extremely short stroke of the valve and its large bearing on the valve plug reduce wear to the absolute minimum. The hole is cleaned by live air at full line pressure.

With its exceptional speed and reliability, plus its extremely light weight, the Gardner-Denver model S-33 is an ideal drill for hard-to-reach places—easy to hold in any position for plugging, chute-blasting and hitch-cutting.

Get full information about the Gardner-Denver S-33 Sinker—bulletin will gladly be sent on request! Write Gardner-Denver Company, Quincy, Illinois.

GARDNER-DENVER
SINCE 1859

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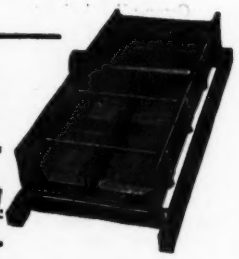

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Uniform in Quality—is a universally acknowledged characteristic of American Cable's Wire Ropes.

Uniform in Service. Being uniform in quality American Cable's Ropes are naturally uniform in service. When American Cable introduced TRU-LAY Preformed, in 1924, we gave all industry a rope that far outlasted ordinary non-preformed, our own make included. Here, too, in increased service, is seen uniformity, for when one TRU-LAY Preformed Rope does a job unusually well, the second or twenty-second TRU-LAY Rope will do equally well.

Uniform in Safety. TRU-LAY Preformed is a safer rope. Its crown wires lie flat and in place so that there is less danger of their wickering out and jabbing workmen's hands, which often causes blood-poisoning. TRU-LAY handles easier and faster, resists kinking and whipping, spools on drums better and rotates less in sheave grooves. TRU-LAY requires no seizing when cut and will not fly apart when broken. Specify American Cable's TRU-LAY Preformed for your next line.

BUY ACCO QUALITY—*whether in American Cable Division's Ropes—American Chains (Weed Tire Chains and Welded or Weldless Chains)—Campbell Abrasive Cutting Machines—Page Wire Fence—Page Welding Wire—Reading-Pratt & Cady Valves—Wright Hoists or any other of the 137 ACCO Quality Products.*

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Green Signifies Full Speed Ahead for National Preparedness.

COAL —A *VITAL* COMMODITY IN OUR NATIONAL DEFENS

BETTER LIGHT WITH BETTER HEAD PROTECTION

Better light for the miner speeds production. *Safe* light speaks for itself. Well-protected heads keep men on the job. The Edison Electric Cap Lamp, with its unequalled volume of useful illumination, can light up the way to higher productivity for every miner in your operations. The M.S.A. Skullgard gives you the advantages of long-proved head protection, correct design and easy wearing comfort that benefits every wearer.

Combine these two—the Edison Lamp and the Skullgard—and you pave the way to greater safety and lower operating costs.

We shall be glad to arrange a demonstration at your convenience—without obligation. Write for descriptive Bulletins in the meantime!

VITAL *to Safer, Better Coal Production*

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